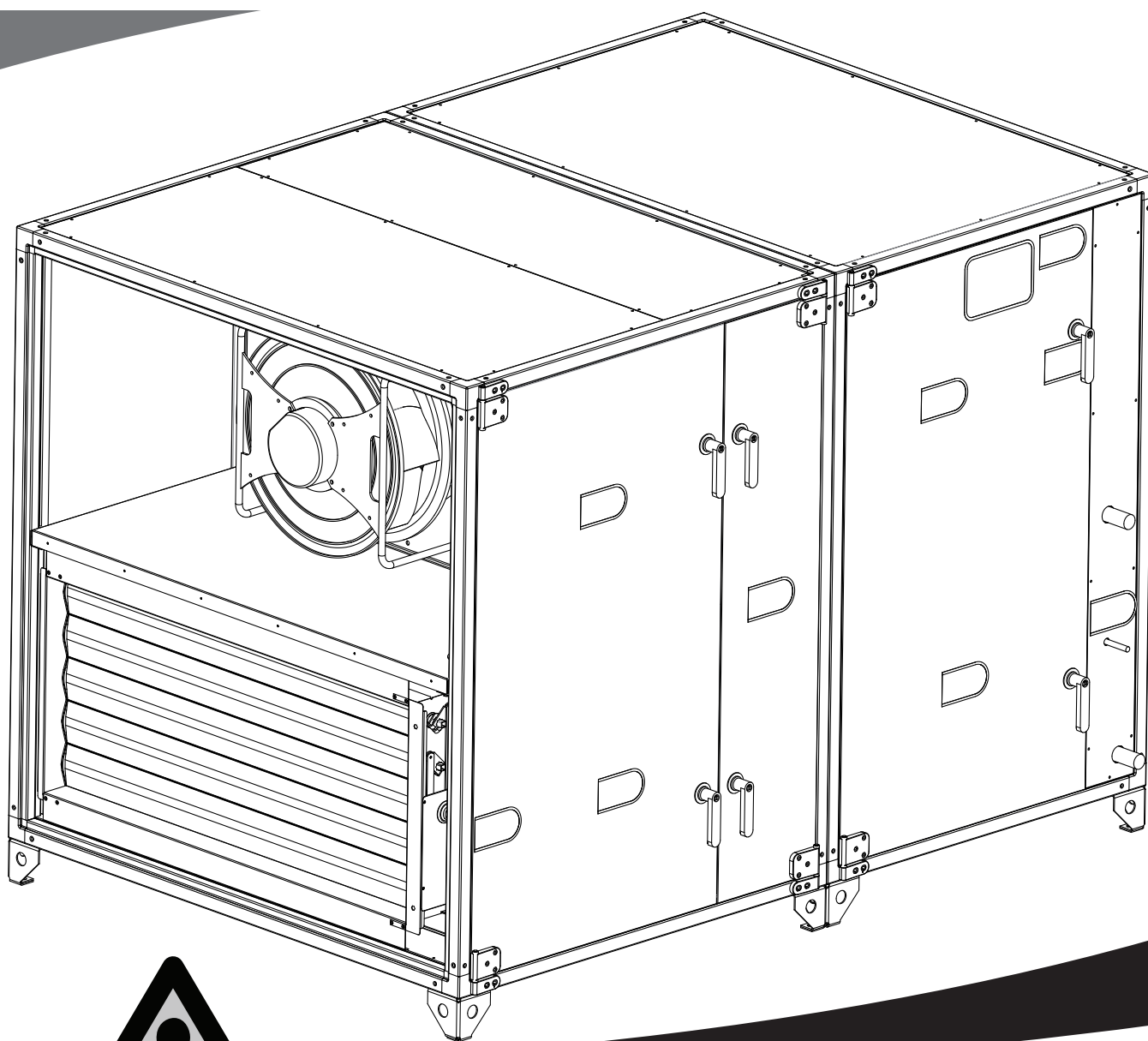


User manual for TIME

Air handling unit

User manual version 1.01.06

Part number for this manual 90925370



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a. Manufacturer

This User Manual covers all air handling units with control system delivered by Systemair A/S.

Manufacturer and supplier data:

Systemair A/S
Ved Milepælen 7
DK-8361 Hasselager

Responsible for documentation: Ulf Bang

b. Name of machines

This manual is about Systemair air handling units with control systems called

TIMEec 10, TIMEec 15, TIMEec 20, TIMEec 25, TIMEec 30, TIMEec 40

c. Declaration of Conformity - example

The manufacturer:

Systemair A/S
Ved Milepælen 7
DK - 8361 Hasselager



Hereby declares that, air handling units of the flowing types:

Delivered with control system

DANVENT DV10, DANVENT DV15, DANVENT DV20, DANVENT DV25, DANVENT DV30, DANVENT DV40, DANVENT DV50, DANVENT DV60, DANVENT DV80, DANVENT DV100, DANVENT DV120, DANVENT DV150, DANVENT DV190 and DANVENT DV240.

TIMEec 10, TIMEec 15, TIMEec 20, TIMEec 25, TIMEec 30, TIMEec 40

Serial No: "YYMM-71800-X"

are manufactured and delivered in accordance with following directives:

Machinery directive	2006/42/EC
EMC – directive	2004/108/EC
Low voltage directive	2006/95/EC
Pressure equipment directive	97/23/EC
European Standard	EN378

Equipment type: **DVU-series**

Consisting of: Compressor, evaporator and condenser

Verification and Assessment by:

Notified Body Bureau VERITAS CE0041 for PED
Bureau VERITAS UK, "Parklands", Wilmslow Road
Didsbury, Manchester M20 2RE

Module: A1

Certificate no: CE-0041-PED-
A1-SYA-001-10-DNK

The declaration is only valid, if the installation of the air handling unit is carried out according to the instructions delivered with the unit. The installer will be responsible for the CE marking and documentation, if any construction or functional changes are applied to the air handling unit.

Hasselager 24. June 2013



d. General descriptions, dangers and warnings





TIME air handling units are order specific machines available in thousands of different configurations. Only a few examples of machine configurations are described below.

The air handling units are intended for the transport and treatment of air between -40 °C and + 40 °C

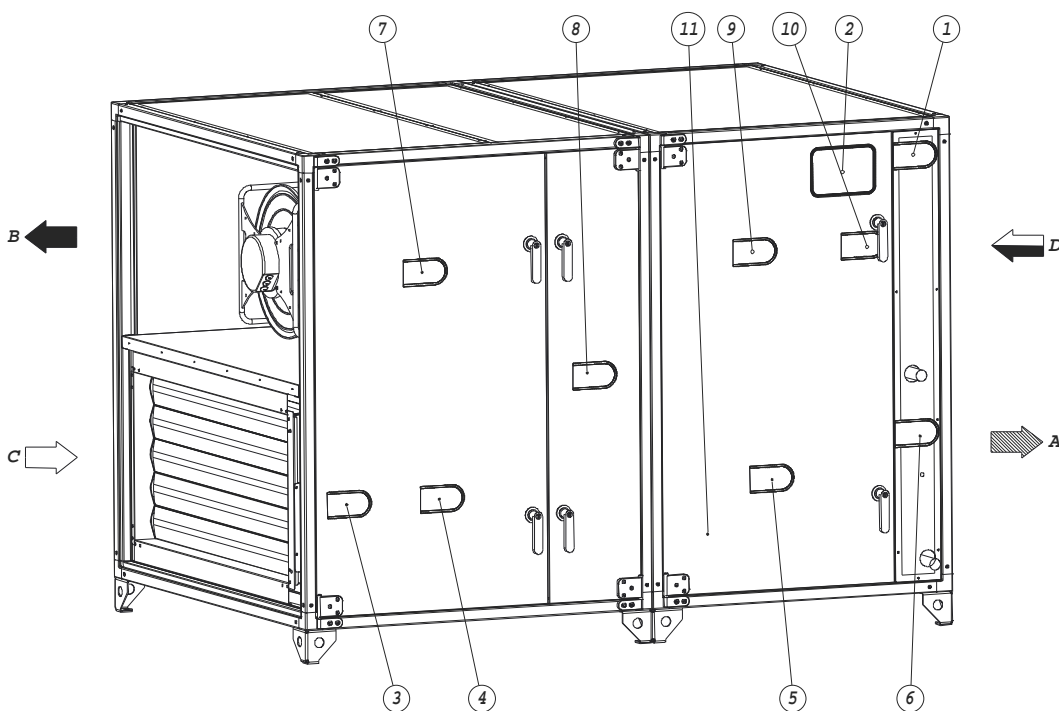
The units are exclusively for comfort ventilation.

Maintenance of the units must be carried out by skilled technicians.

On the drawing below, a right hand unit is shown because the inspection doors are mounted on the right hand side of the unit when looked in direction of SUPPLY airflow. The unit below is with rotary heat exchanger.

Position	Description	Symbol
A	Connection, supply air (to the rooms)	
B	Connection, exhaust air	
C	Connection, outdoor air in	
D	Connection, extract air (from the rooms)	








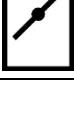
d.1 Overview via pictograms on the inspection side of the unit



This is a right hand unit because the inspection doors are mounted on the right hand side of the unit when looked in direction of SUPPLY airflow.

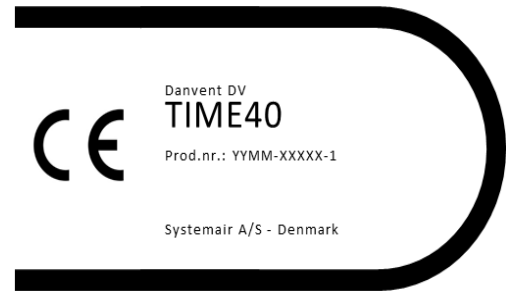
d.1.1 Where are pictograms placed on the units

Example (Symbols and descriptions of functions for fast identification)

Position	Description	Symbol
1	The CE label and the unique production number of this machine	CE
2	Machine card	
3	Damper - supply air	
4	Filter - supply air	
5	Fan- supply air	
6	Heating battery - supply air	
7	Fan - extract air	
8	Rotary heat exchanger	
9	Filter – extract air	
10	Damper – extract air	
11	A label inside the integrated cabinet shows data about the power for the unit and the fuses as well as the list of terminals for the connection of external components.	

d.1.2 CE label – example for TIME unit

This is the mandatory informations for the CE marking with; Product name (in this example TIME 40, where 40 informs about the size of the unit), Production number for the complete unit (in this example YYYY-xxxxx-1, where YYYY informs about year and month for the manufacture), xxxxx-1 is the unique production number.












d.1.3 Pictogram on a door for a fan in a TIME unit

Example of the pictogram with the symbol for the function - fan, Systemair product name is this example is - Fan Supply, production number for the complete unit (in this example xxxxx-1) and the customer's name for the unit, always written after - Plant no: _____



d.1.4 Pictograms for all available functions in the units

Id	Description	Symbol
DVA	Damper	
DVF	Bag filter	
DVC	Rotary heat exchanger	
DVQ	Counter flow heat exchanger	
DVH	Heating battery	
DVK	Cooling battery	
DVU	Heat pump unit	
DVE	Plug fan EC Blue	
DVD	Silencer	

d.1.5 Pictograms about warnings and dangers on the units

Pictograms according to EN1886 about



Warning about danger by rotating parts



Warning about danger by electricity



Warning about danger by heat

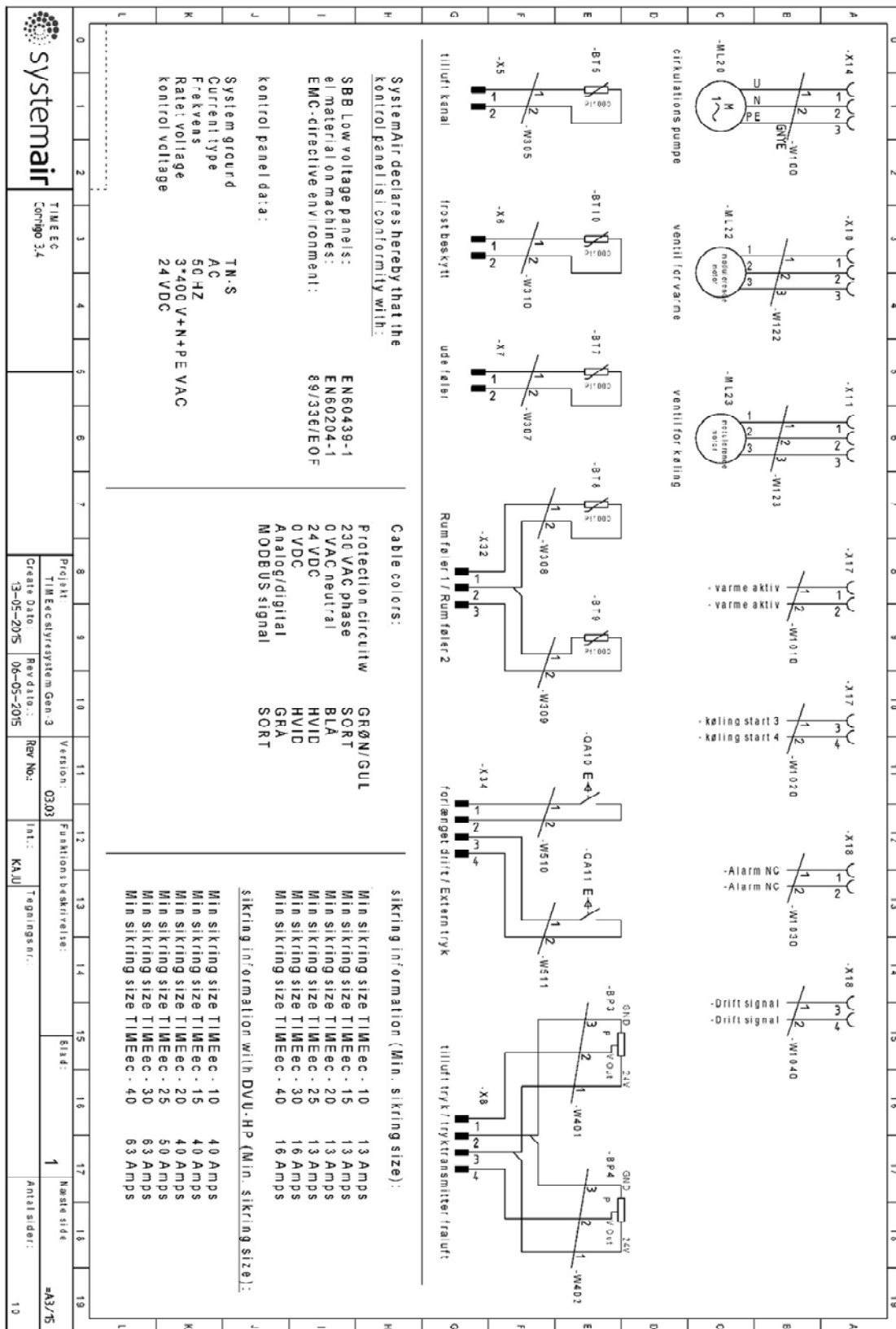
d.2 Data about the unit according to card and label on and in the unit

d.2.1 Machine card with unique data on every unit

An example of a machine card is shown below.

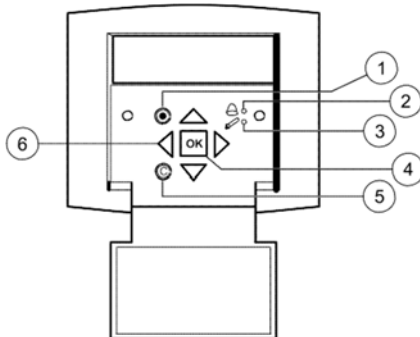
Type	DV-YY		Systemair A/S Ved Milepælen 7 DK-8361 Hasselager Tel. +45 87 38 75 00 Email: mail@systemair.dk	
Order number	XXXXX-X			
	Supply	Extract		
Air flow	10000 m3/h	10000 m3/h		
Total pressure drop	686 Pa	639 Pa		
Heating	31.00 kW			
Cooling	57.14 kW			
Heat recovery	82.7 %			
Heat recovery Capacity	142.8 kW			
Fan	Supply	Extract	Data for cabinet	
Fan type	M-RH56Cpro	M-RH56Cpro	Ground for unit	TN-S
K-factor (p=1,2 kg/m3)	308	308	Current type	AC
Fan speed	1415 RPM	1385 RPM	Frequency	50 Hz
Maximum fan speed	1460 RPM	1460 RPM	Mains supply	3*400+N+PE VAC
Motor type	IE2	IE2	Ikmax	16 kA
Motor norm size	ABB-100LD	ABB-100LD	Ikmin	650 A
Motor speed	1445 RPM	1445 RPM	Max fuse	25 A
Power	3.0 kW	3.0 KW	Min fuse	10 A
Voltage	3x400 V	3x400 V		
Filter	Supply	Extract	Sales agent:	
Filter class	F7	F7	Systemair Fans & Spares Ltd	
Dimensioning pressure drop	130 Pa	130 Pa	72 Cheston Road, Birmingham, B7 5EJ	
Initial pressure drop	71 Pa	71 Pa	England	
Final pressure drop	189 Pa	189 Pa	Tel: +44 (0) 121 322 0200	
			http://www.systemair.co.uk	

d.2.2 Example of label placed inside the cabinet



d.3 Hand terminal

The hand terminal is delivered in a cardboard box containing the other external components. This cardboard box is usually, but not always, placed in the section with the supply air fan. The Operator's Guide for the hand terminal is the annex 15 attached to this – User Manual.



1. ALARM: Press for alarm list
2. Alarm LED – red light for alarm
3. LED indicating change of parameters
4. OK/ENTER
5. Press for clear
6. Press for move of curser in menu

Important! All LEDs on the hand terminal must be off before startup of the unit.

d.4 Dimensions of the units

See annex 2 with information about the exact dimensions.

d.5 Ordinary automatically operation – only manual operation by new parameters.

The unit is operating fully automatically and manual operation includes only selection of new parameters via the buttons on the hand terminal. The hand terminal is connected by a cable to the controller in the cabinet. 10 meters of cable is delivered with the unit and the customer has the possibility to replace this cable with an identical type of cable that is up to 100 meters long. The alternative is that the controller is connected to a BMS system with the ability to select new parameters via PC, tablet, or SmartPhone.

d.6 Warnings about dangers

Pictograms are according to EN1886 about;



Warning about danger by rotating parts



Warning about danger by electricity



Warning about danger by heat



Disregards of instructions shown on warning signs are connected by risk for injury or damage on material.

e. Drawings, diagrams, guides and instructions for the use, maintenance and repair

All air handling units are CE marked, and delivered as machines.

If the buyer carries out changes or adds components in or on the machine, the buyer must issue a new CE marking.

- Unique drawings, data and description of functions for the delivered unit – annex 2
- Wiring diagrams – annex 14
- Operator's Guide – annex 15
- Instructions for use of the machine – section k in this manual
- Instructions about adjustment and maintenance – section r in this manual
- Safety during adjustment and maintenance – section s

f. Employees in charge of operation/control/maintenance

TIME units are constructed and built with a fully integrated control system. After start-up and hand-over from installer to operators, the unit operates fully automatically.

Indications of operating status as well as indication of faults are visible in the display and on the LEDs at the hand terminal. The operators can enter new parameters in the controller via the buttons on the hand terminal. Alternatively, the controller can be connected to a BMS system so that new parameters can be selected via PC, tablet or Smartphone. The operators do not need to open inspections doors for the operation

Skilled technicians must carry out maintenance as well as repairs.

g. Intended use and range of applications

The air handling units are intended for the transport and treatment of air between -40 °C and + 40 °C. The units are exclusively for comfort ventilation. The units are not for environments that exceed the corrosion class C4 according to EN ISO 12944-2.

Intended applications for the units are:

Offices, teaching rooms, hotels, shops, homes and similar comfort zones.

h. Unintended use and misuse – inappropriate applications for the machine

Units for outdoor installation must be specified and ordered for outdoor installation.

The units must not be used in environments that exceed corrosion class C4 according to EN ISO 12944-2, and for transport of solid particles.

Examples of not intended use:

Kitchen extraction, swimming pools, off-shore, Ex-areas, drying of washed clothes.

Do not use the unit with partly finished duct systems. Do not use the unit for ventilation of the building site until the unit is properly provided with guards.

h.1 Air handling unit in operation

The pressure difference between interior and exterior of the unit must not exceed 2000 Pa.

Before start-up of the unit all ducts, safety guards and all protective devices must be mounted to prevent any access to rotating fan impellers. All inspection doors must be closed and locked when the unit is in operation. Do not use the unit without filters.

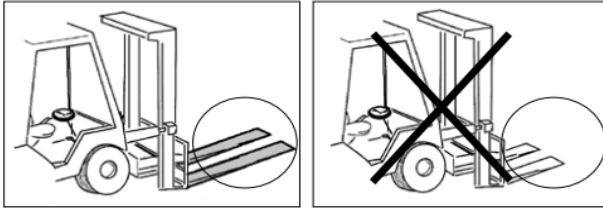
i. Instructions for unloading on the site as well as installation and connection

i.1. Unloading on the site

The air handling unit – AHU – is delivered as one section or in several sections, which are to be assembled on site. The AHU is delivered on transport pallets, legs or on a base frame. Loading and unloading as well as transport on the site is possible by fork-lift truck or by crane using suitable lifting straps.

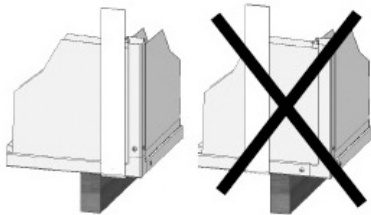
i.1.1 Unloading by fork-lift truck

The forks of the truck must be sufficiently long to avoid any damage to the AHU underside.

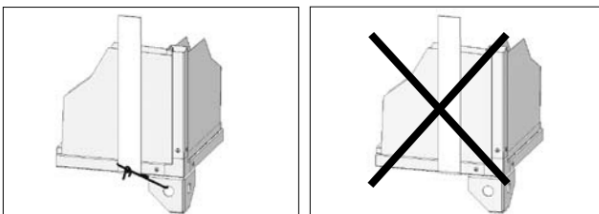


i.1.2 Unloading by crane

AHU delivered on transport pallet must be lifted by straps as shown in the illustration.



AHU delivered with legs must be lifted by straps secured to the legs as shown in the illustration.



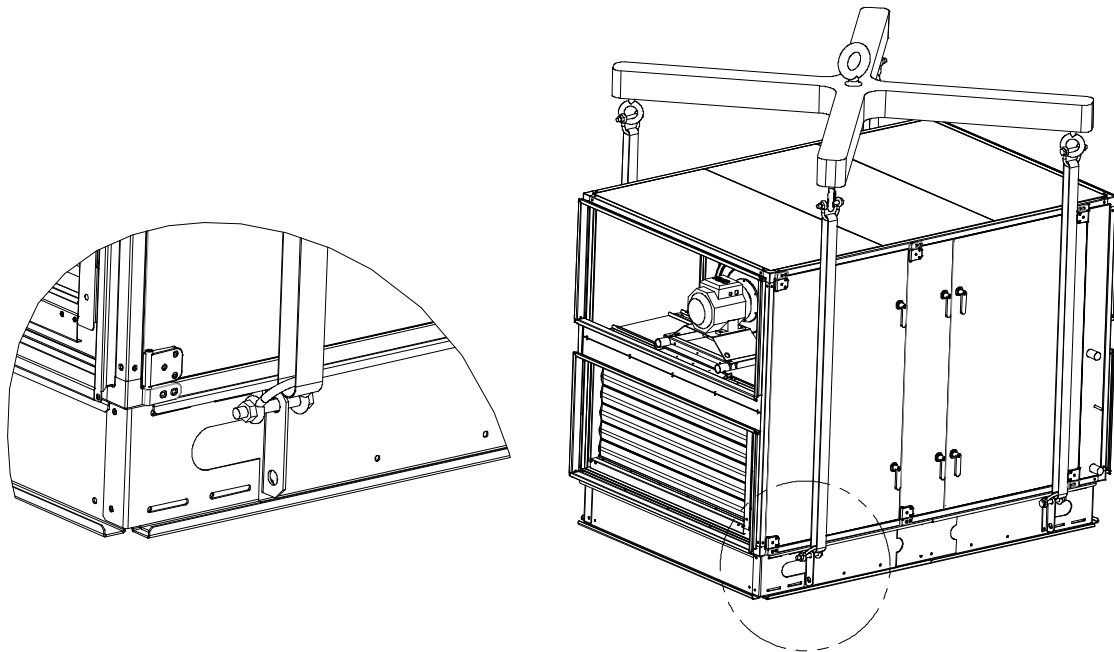
i.1.3 Transport of unit without base frame on the site

Units without base frame are always delivered in sections with each section on a pallet. Sections can be transported on the site by hand manual forklifts.

i.1.4 Lifting a unit with straps

Use an appropriate lifting beam with a sufficient span to avoid that the straps touch and damage the drip nose profiles and the inspection side with handles, pipes and accessories – for example manometers, cabinets, tabs for measuring the pressure.

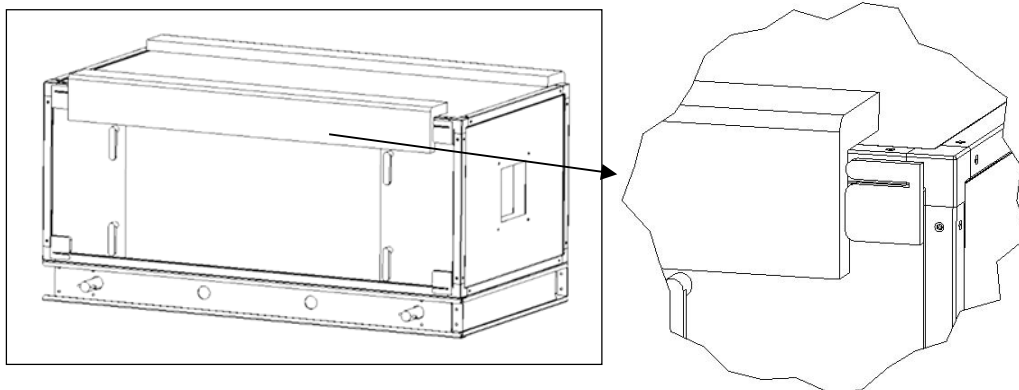
i.1.5 Lifting a unit with preinstalled brackets on the base frame for lifting.



Lifting beam and straps are not included in the delivery.

i.1.6 Roof unit with bitumen roof

Avoid damaging the drip nose profiles along the bitumen roof. Keep the protection profiles of Styrofoam on the unit until the installation has been completed. If the unit is lifted by straps, the straps must be kept away from the drip nose profiles by bars to avoid damage to roofing profiles.



i.1.7 Roof unit with steel roof

For units with steel plate roof, the steel plates are delivered uninstalled on a separate pallet. Do **not** step or walk on the plates.



i.1.8 Pre-assembly storage

The AHU must be protected from the weather and accidental impact. Plastic packaging **must** be removed and the unit covered with tarpaulin or similar materials. In order to minimize condensation, sufficient air circulation must be ensured between the covering and the unit.

i.1.9 Tilt less than 30° during transportation of the section with heat pump – DVU

During transportation, the unit section - DVU - **must** always be in the upright position or tilted less than 30°. If it is necessary to tilt the unit more than 30°, the suction pipe of the compressor must point upwards to prevent the escape of oil from the compressor sump.

i.2. Installation - mechanical

i.2.1 Free area in front of and above the unit

Important! When positioning the unit on the site, it must be ensured that an area with the same width as the unit is kept free for service and inspection and also for replacement of fans and exchanger, if needed. The width of the free area must be at least 900 mm.

Important! For safe access to the cabinet with electrical components, if the cabinet is placed on top of the unit, the free area from the upper edge of the cabinet to the ceiling must be at least 700 mm.

i.2.2 Supporting surface

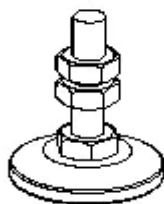
The surface beneath the unit must be level, horizontal and vibration-free. The surface must be able to withstand the load of the AHU. Weights of the sections are written in Annex 2.

Remember! Duct work must be sound insulated and must not be mounted directly on beams, trusses or other critical building parts.

i.2.3 Adjustable feet under legs or base frame and transport of sections

Adjustable feet are provided in a carton box placed inside the unit. Adjustable feet are delivered for indoor units and not for outdoor units.

Sections can be transported on the site by hand manual forklifts or similar. The frame profiles in the edges of the sections have carrying capacity for lifting by the hand manual forklifts.



i.2.4 Base frame assembly

Base frame is delivered unassembled for the indoor units that are delivered in sections on pallets. Assembly of the base frame is illustrated on 4 pages in a manual in a plastic bag which is attached to one of the large base frame parts.

The 4 pages with the illustration regarding the assembly of the base frame are also available in this user manual in annex 4 or 5.

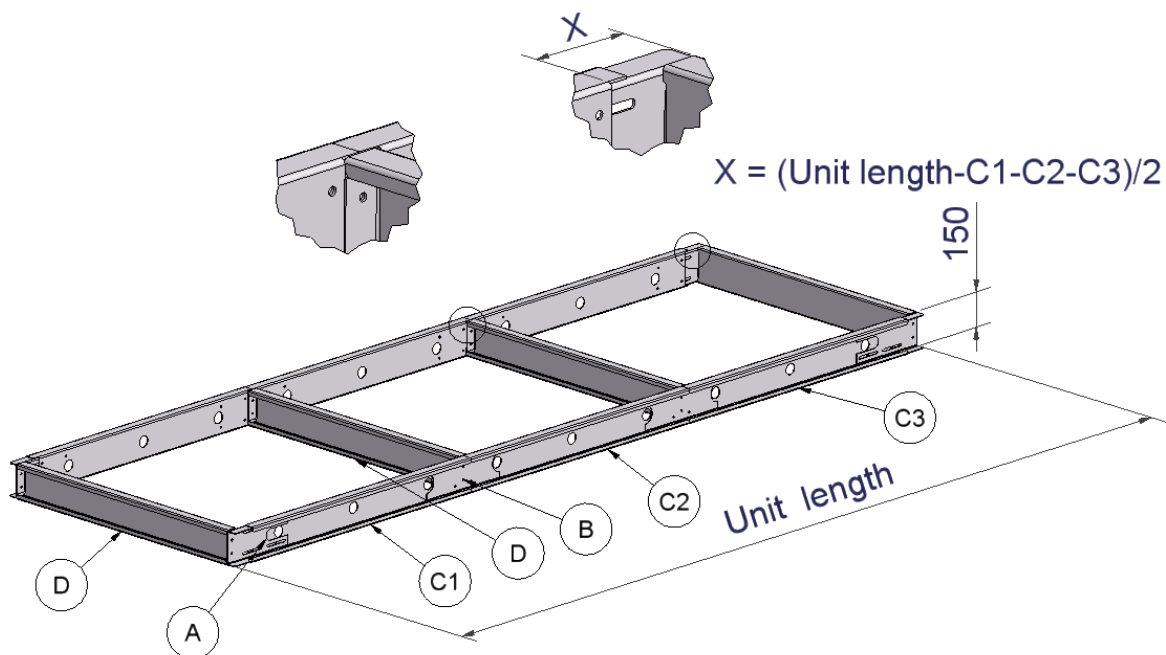
There are two types of base frames:

1. 150 mm high base frames
2. 250 mm high base frames

There are 2 different manuals and each of them illustrates the assembly of base frames:

1. Manual about the 150 mm high base frames for AHUs in the sizes from 10 to 40. The name of this manual is – **Base frame 150 DVZ 10 - 40**
2. Manual about the 250 mm high base frames for AHUs in the sizes from 10 to 40. The name of the manual is – **Base frame 250 DVZ 10 – 40**

Example of 150 mm high base frame for TIME in the size from 10 to 40



Mount adjustable feet with a distance of maximum 1500 mm between each foot under the base frame. The base frame can now be levelled by the adjustable feet. The next step is to place and assemble AHU sections on the base frame.

i.2.5 Base frames for outdoor units

Outdoor units must be installed on 250 mm high base frames and are always fitted to the AHU sections. Hot-dip galvanized base frames are recommended for outdoor units. Systemair delivers these base frames without the above mentioned adjustable feet.

i.2.6 Installation on the site of unit sections at the base frame when sections are delivered on pallets

Lift up the section by hand manual forklifts to the level where the underside of the section is even with the overside of the base frame.

1. Pull the section to the correct position on the base frame by lifting straps – it is maybe necessary to support the section by heavy duty furniture trolleys (see the photos below)

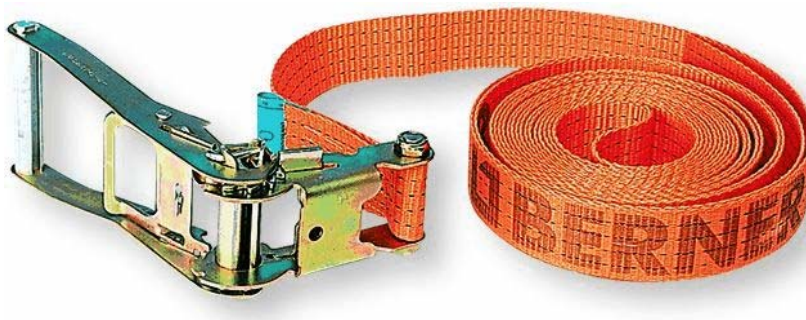


Example of heavy duty furniture trolley turned with the wheels upwards. Placed in this way on the forks of the hand manual forklifts the heavy duty furniture trolleys are suitable for safe and careful rolling of the unit sections over to the base frames.



Example of very heavy duty furniture trolleys. Turned with the wheels upwards and placed on the forks of hand manual forklifts these heavy duty furniture trolleys are very suitable for safe and careful rolling of the unit sections over to the base frames.

2. Pull sections together with lifting straps. We recommend the below shown type of brackets because this type is not damaging the frame profiles of the units. An example of lifting straps is shown below.



3. Sections are mounted to base frames with long self-drilling screws. The frame profile under the inspection doors is placed over the horizontal profile of the base frame. See the example on the photo below.



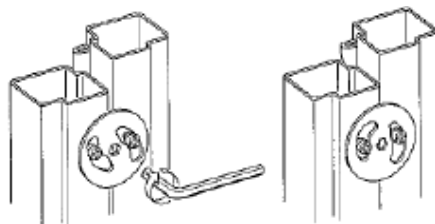
i.2.7 Joining the AHU sections

The sections must be placed on the base frame and if the unit is delivered with 100 mm legs, the sections must be positioned directly opposite each other.

1. Ensure that the internal factory-fitted rubber sealing is undamaged
2. The sections are then to be positioned directly opposite each other. If the sections are built with legs, the adjustable feet can be used to get the sections parallel and at the same height.
3. Press the sections hard together so that the rubber profiles are so flat that the iron frames of the two sections are joined. Straps with tensioner as shown below are suitable for pressing the sections hard together.



4. The sections are then to be locked permanently together with the black plastic-coated Systemair Disc-Locks. The Disc-Locks are delivered in a carton box placed inside the unit. Place each Disc-Lock over the 2 factory fitted locking pins. The discs and locking pins are not reliable for pulling the sections together. They are only sufficient for keeping the sections well together, so just turn each disc gently with the supplied Allen key. Use a sequence where each disc is tightened with only one click at a time. If the unit is placed too close to a wall with no space left for the mounting of Systemair Disc-Locks, brackets must be placed inside the unit to keep the sections permanently together (brackets for this purpose are not delivered by Systemair)



i.2.8 Fitting the ductwork

Flexible duct connections between AHU and ductwork must always be installed. Be sure that flexible duct connections are almost fully stretched. (Flexible connections are ordered as accessories and they are placed inside the unit). At the fan outlet on a centrifugal fan, the duct size should be as close to the outlet size as possible. Avoid blockage and turbulence at the fan outlet.

i.2.9 Risk of stack effect by vertical ducts and wind pressure on louvers

On special occasions stack effect – also called chimney effect – in the ducts create airflows that drives the impellers by turned off motors.

A rotating impeller is a potential hazard during cleaning and maintenance of the unit.

Eliminate this airflow by dampers with spring return motors for automatic closing of the dampers - even by power failure.

Important! The Systemair air handling units can be ordered and delivered without dampers, and the installer/user must check that duct systems with the described risk of stack effect (chimney effect) will be provided with dampers and spring return motors.

i.2.10 Refitting of guards

The guard is a safety guard installed inside the door. Tools are necessary for the removal of the guard. If the guard has been demounted during the installation on the site, the guard must be refitted before startup of the unit.



Insert the edges of the guard in the frame profile in the groove that is in the frame profile, and connect both parts of the guard at the middle with 2 screws.

Replace the vibration damping foam rubber list if it is damaged.

i.3. Installation - electrical

i.3.1 Description

The position of components is shown and described in annex 2.

Connections to terminals are shown in the wiring diagram – annex 14.

When control of constant pressure in the ducts (also called demand controlled capacity) is required, the pressure transmitters must measure in the duct system at places where all pressure changes can be registered accurately for reliable pressure control. This placement is left to the customer's free choice.

It is important to achieve a constant pressure – also for the most faraway diffusers.

i.3.2 Wiring diagrams

The wiring diagrams are printed in separate manuals delivered with the units as annex 14.

The wiring diagrams are not unique for the order specific units, but it is standard wiring diagrams with data about all configurations of the units. Hereby the wiring diagrams will inform about components that are not ordered and delivered. See the order confirmation and annex 2 with exact information about the accessory components that are ordered and delivered.

The wiring diagram includes:

General description, Circuit diagrams, Cabinet layout, Terminal matrix and Cable plan.

The wiring diagrams are on the DVD delivered with every unit.

i.3.2.1 TIME units - label inside the cabinet.

- Label with data about the cabinet – including data about power, fuses and the terminal plan for the connection of external components – see section d.2.2

i.3.3 Installation of mains power supply

An AC/DC residual current device must be installed in the power supply. The power supply for the units is 3*400 V + N + PE - 50 Hz. Protection of the units in accordance with the local statutory requirements for the additional protection of systems with frequency converters. The operator is responsible for the installation of the necessary protection equipment (supply disconnecting device is not delivered by Systemair).

i.3.3.1 Necessary mains power supply for TIME units - without power for DVU

Necessary mains power supply appears from the table below and the wiring diagram in annex 14. This information is also printed on the unique machine card placed on the front of every unit (see example of a machine card in section d.2.1).

Unit	Motor
TIME 10	0.50 kW 0.48 kW 1.35 kW
TIME 15	0.48 kW 1.35 kW 2.50 kW
TIME 20	1.35 kW 2.50 kW 1.25 kW 2.40 kW
TIME 25	1.25 kW 2.40 kW 1.05 kW 2.00 kW 3.60 kW
TIME 30	1.05 kW 2.00 kW 3.60 kW 3.50 kW 5.40 kW
TIME 40	3.50 kW 5.40 kW 3.40 kW 5.00 kW

i.3.3.2 Necessary overvoltage protection device, that leads lightning overvoltage to an earth lead on a safe way.

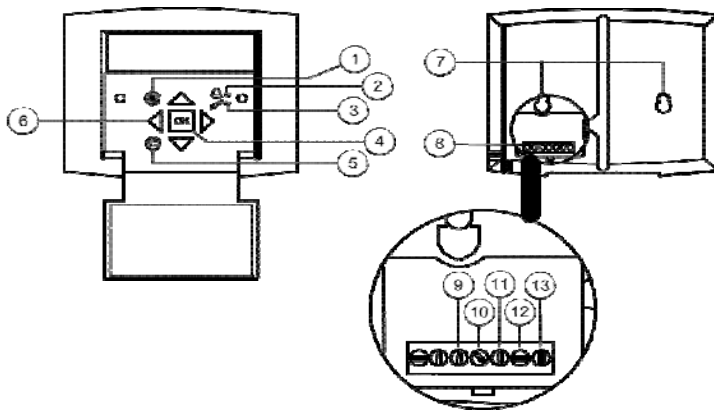
The Installer and user must be aware of the fact that lightning strikes make a risk that requires installation of overvoltage protection devices to lead the lightning overvoltage to an earth lead in a safe way. Installer and user must take care of this according to local statutory requirements.

i.3.4 Electrical connection of components and functions

External components and functions are delivered according to the order confirmation. Cable numbers appear from the label inside the cabinet, and cable numbers appear from the wiring diagrams.

i.3.4.1 Connection of the Systemair Control Panel to the Corrigo E28 controller

The SCP panel is provided with 10 metres of cable. Demount the cable at the back of the Systemair Control Panel - pull the cable through the cable entry in the cabinet and remount the cable in the panel, or add more cable – up to 100 m of cable between the Systemair Control Panel and the controller is possible. Place the Systemair Control Panel on the outer side of the unit or on a wall.



Position	Description
1	Alarm button: Press for alarm list.
2	Alarm indicator: Flashing for unacknowledged alarm.
3	Write enable LED: Slow flashing indicates parameters can be changed.
4	OK button: Press to activate a selected menu/setting, if possible.
5	Button for clear: Abort a parameter setting or – if possible - restore the original value.
6	Right/left – and up/down buttons: Used for navigation up and down and to the right and left in the menu tree. Up/down buttons are also used for increasing or decreasing values of parameters.
7	Holes for mounting
8	Terminal block
9	No cable on terminal 5 for software version 3.4(illustrated with number 9 on the above drawing)
10	Brown cable on terminal 4 for software version 3.4(illustrated with number 10 on the above drawing)
11	Yellow cable on terminal 3 for software version 3.4(illustrated with number 11 on the above drawing)
12	White cable on terminal 2 for software version 3.4(illustrated with number 12 on the above drawing)
13	Black cable on terminal 1 for software version 3.4(illustrated with number 13 on the above drawing)

i.4 Installation – Pipes for water – hot and chilled, valves and drains

i.4.1 Description

If ordered with the unit, the valves and valve motors are stored in a carton box placed inside the unit. Water trap(s) – standard or optional - is (are) necessary to ensure escape of water from the tray under plate heat exchanger and (or) cooling coil. Water trap(s) is (are) stored in a carton box placed inside the unit.

i.4.2 Pipe connections

Connection pipes on heating- and cooling coils are provided with external thread. Drainage outlets on drip trays are provided with external thread.

i.4.3 Possibility of extracting components from the unit

Pipes and cables must not obstruct the inspection doors and components which can be extracted from the unit. Potential components for extraction are filters, fans and rotary heat exchanger.

i.4.4 Pipe connections to batteries

i.4.4.1 Heating coils

Pipes for hot water must be protected by insulation against frost and loss of heat. Further protection against frost can be obtained by installing electrical heating wires around the pipes and under the insulation combined with temperature sensors and a control system. Pipes, insulation, electrical heating wires, control system for heating wires and circulation pump are not delivered by Systemair.

i.4.4.2 Cooling coils

If ordered with the unit, the valves and valve motors are stored in a carton box placed inside the unit. Pipes for cooling must be protected by insulation against condensation on the pipes and loss of cooling in the summer. Pipes and insulation are not delivered by Systemair.

i.4.4.3 Rigid pipe mounting brackets for valves, circulation pumps and pipe system

The coil and pipes from the coil are not constructed to withstand the weight and stress from valves, circulation pumps, long pipes and insulation of pipes. The system must be supported carefully in rigid pipe mounting brackets to roof, floor and walls.

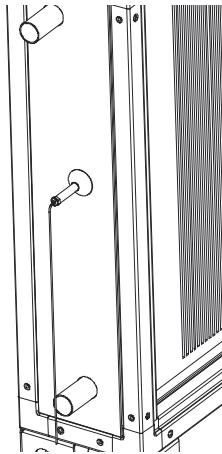
i.4.4.3.1 Pipe connection to heating coils

The heating capacity of the coil with only 2 rows is independent of the connection of the hot water in equal flow or in counter flow to the direction of the air, but connection of the hot water to the pipe marked for inlet and the return water to the pipe marked for outlet is very important to ensure that the sensor for transmission of the water temperature really will be placed in a return circuit of the coil (Screw-joint for the water temperature sensor is welded in the main collection pipe for return water).

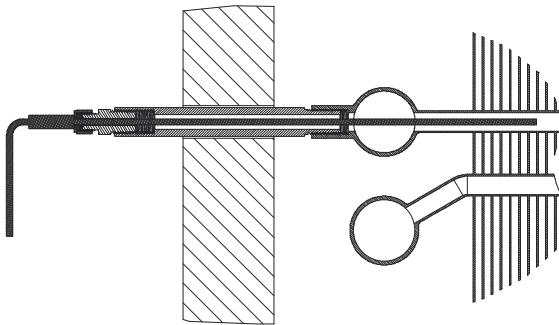
For the frost protection of heating coil, the water temperature in the coil is transmitted to the controller. The controller always generates a signal to the valve motor that keeps a sufficient flow of hot water to protect the coil against frost. This frost protection is also activated when the running mode is “off”. Coils with 3 rows or more must always be connected in counter flow to the airflow.

NOTE: If glycol is added, the glycol must be without additives and auto glycol must not be used. Automatic bleeding has to be installed at the highest point of the 2 pipes — supply or return pipe.

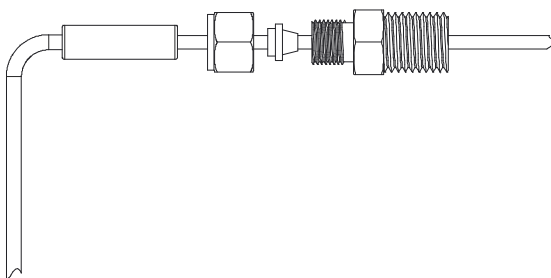
If the heating battery is built with 3 or more rows, the water flow must be in counter flow to the direction of the air.



To protect against frost a temperature sensor for the transmission of an analog signal to the controller is placed in a pipe on the collection pipe for return water. The sensor must be fitted water tight with a cap in the pipe before water under pressure is in the battery. The pipe for the sensor is soldered on the collection pipe and it is important to hold contra on the pipe, when the cap is tightened.



Battery seen from above. The sensor measures the water temperature of the water inside one of the small pipes for return water in the battery. The sensor reduces the area in this pipe and hereby also the flow of warm water in this pipe. The temperature in this pipe is reduced more than the temperature in all other pipes by the airflow through the battery. Because the lowest temperature in the battery probably is measured here, this system creates early and safe warning of frost.



It is important that the cap is tightened sufficient to keep the sensor system fully water tight.

i.4.4.3.2 Pipe connection to cooling coils for chilled water

Coils with 3 rows or more must always be connected in counter flow to the airflow.

NOTE: The glycol must be without additives and auto glycol must not be used.

Automatic bleeding has to be installed at the highest point of the 2 pipes — supply or return pipe.

i.4.4.3.3 Valve motor and valve for heating

The valve and valve motor are not installed. 2-way or 3-way valve is available.

i.4.4.3.4 Valve motor and valve for cooling

The valve and valve motor are not installed. 2-way or 3-way valve is available.

i.4.5 Draining condensate water

Drip trays for collection of condensate water are installed under plate heat exchanger and cooling coil. Each drip tray is provided with a drainage outlet. A water trap is always necessary. To avoid freeze ups and frost bursts of water trap and pipes, sufficient insulation is recommended and installation of heating between the insulation and water trap/pipes could even be necessary (insulation, heating and controller for the heating are not delivered by Systemair).

i.4.6 Draining condensate water from plate heat exchanger

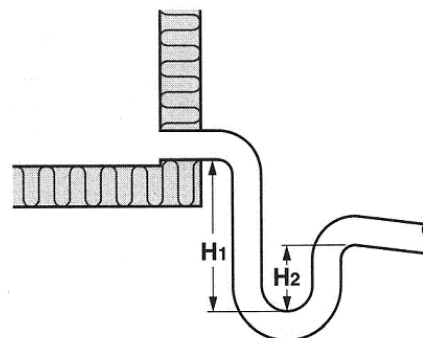
Condensate from the plate heat exchanger is collected in the drip tray. Heavy negative air pressure in this section prevents the water from flowing out of the drainpipe. A water trap with sufficient closing level of the water is essential to ensure that condensate water flows out of the unit. The closing level of the water trap must be estimated correctly to ensure safe escape of the water (see the illustration and estimate the minimum closing level according to the table). The pipe diameter of the water trap and sewage system must be identical to the pipe diameter of the drainage outlet from the tray.

A water trap is optional and installation of the water trap is not included.

Remember to check that there is water in the water trap.

Negative pressure P (Pa)

P	H1 Minimum	H2
500 Pa	100 mm	40 mm
750 Pa	150 mm	55 mm
1.000 Pa	190 mm	70 mm



i.4.7 Draining condensate water from cooling battery

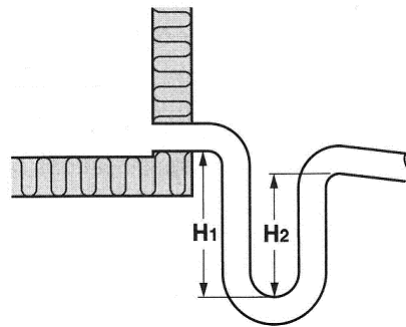
If the cooling battery and the drip tray is placed in the unit where negative pressure (underpressure) occurs, the closing level of the water trap must be estimated correctly. See the above-mentioned information in section i.4.6 – Draining condensate water from the plate heat exchanger.

If the cooling battery and the drip tray is placed in the unit where positive pressure (overpressure) occurs, the closing level of the water trap must be estimated correctly as shown on the illustration below. A water trap is optional and installation of the water trap is not included.

Remember to check that there is water in the water trap

Positive pressure P (Pa)

P	H1 Minimum	H2
500 Pa	90 mm	65 mm
750 Pa	120 mm	90 mm
1.000 Pa	150 mm	120 mm



j. Installation and assembly instructions for reduction of noise and vibration emissions

Due to the design and construction of the units the (A) weighed sound pressure level from fans and other components do not exceed 70 dB (A) outside the units.

Data about sound in annex 2.

Installation of the units on springs will reduce the transmission of noise and vibrations to the building.

Systemair does not deliver springs for this purpose.

Flexible connections between the units and the ducts are available as accessories.

k. Instructions for putting into service, adjustments, use and commissioning.

k.1 Print-outs on paper

The documents listed below are always printed on paper and delivered together with the units according to the Machinery Directive and the related national laws

This User Manual with;

- Declaration of incorporation – annex 1
- The unique technical data for this unit - annex 2
- Assembly instructions– annex 4- 10
- Printed form for Commissioning protocol - annex 11
- Test report – annex 12
- Wiring diagrams - annex 14
- Operator's guide for the Systemair control panel - annex 15

k.2 Electronic media

A DVD is delivered with every unit. The below-mentioned documents are available on every DVD and this means that every DVD is provided with information about many components that are not delivered with every unit. The documents on the DVD:

Common

- This User Manual
- Operator's Guide
- Commissioning Protocol as a Word-file for modification by the installer

Components in the control system

- Manuals for the controller – Systemair E28
- Information about Building Management Systems
- Damper motors
- Filter guards
- Temperature sensors
- Fire thermostats
- Smoke detectors
- Pressure transmitters
- Valves
- Valve motors
- Control panel
- E-Tool software for fast communication with the controller
- Other

k.3 Documentation is available for download from <https://techdoc.systemair.dk>

Your local Systemair company is able to provide the data.

k.4 Start-up by installer

All protection and safety measures must be met before start-up of the unit. The mains supply voltage must also be checked too. The mains supply voltage must be measured at the supply terminals in the cabinet.

k.4.1 Checklist, relevant values

k.4.1.1 Checklist prior to start-up

- Is the unit assembled correctly with its functions in the correct order? See annex 2.
- Are the sections and ducts assembled correct? See annex i.
- Check that fans and anti-vibration mounts are not damaged after transportation and installation.
- Is the rotary exchanger turning freely?
- Are safety guards installed correctly?
- If the unit includes integrated heat pump (DVU), check whether it is installed and supervised by qualified service personnel.
- If the unit contains electric air heater, make sure that the supply isolator disconnects with the unit.
- Ducts - are all ducts installed?
- External components - are the valve and valve motor installed correctly?
- Is the circulation pump installed correctly?
- Is water under pressure in the coil and circulation pump?
- Are the pressure transmitters installed and connected correctly? (If this is a system with pressure transmitters in the ducts)
- Main power supply:
 - Connected correctly? (3x400 V + N + PE)
 - Are control signals for actuators connected correctly?

k.4.1.2 Switch on power

Do not start until all safety procedures have been completed and ensure that inspection doors are closed and locked.

Switch on power and the unit should be ready for the start-up.

For start-up see the Operator's guide for the Systemair control panel - annex 15 (this manual is delivered with the unit – printed on paper and also available on the delivered DVD).

K.5 Adjustments and use

Adjust the factory set values for parameters on the Systemair Control Panel or via the software E-Tool on a PC. See the Operator's guide for the Systemair control panel – annex 15 (this manual is delivered with the unit – printed on paper and also available on the delivered DVD. Further information about the controller is available in the Corrigo E28 User Manual that is available on the delivered DVD.

E-Tool software is also available on the delivered DVD and for download from a homepage.

K.6 Description of functions

K.6.1 Remote control

k.6.1.1 Communication WEB-master (TCP/IP Exoline) to PC and Android telephone

The controller has been prepared with a WEB-master interface (WEB side integrated) available when connected to a LAN network. It is possible via the LAN network to read values and to change some

parameters – for example set-point temperatures, schedules, air flow capacity. It is possible to read and reset present alarms. There are 2 levels of login.

k.6.1.2 Communication to BMS systems with MODBUS

The controller has been prepared for communication via RS485 communication port to a MODBUS based BMS system (Building Management System).

The controller can work as a stand-alone system without any support from other controllers.

Special set-up of the controller for communication with the BMS system is not included in the delivery from Systemair.

k.6.1.3 Communication to BMS systems with LON

The controller has been prepared for communication via LON communication port to BMS systems (Building Management Systems). The port uses LonWorks according to the LonMark-guidelines. The LON-interface variables are available from Systemair. The controller can work as a stand-alone system without any support from other controllers.

Special set-up of the controller for communication with the BMS system is not included in the delivery from Systemair.

k.6.1.4 Communication to BMS systems via BACnet

The controller has been prepared for BACnet TCP/IP interface. This can be used for communication with a BMS system (Building Management System).

The controller can work as a stand-alone system without any support from other controllers.

Special set-up of the controller for communication with the BMS system is not included in the delivery from Systemair.

K.6.2 Extended operation and external start/stop (for example by presence detectors)

When the unit is running at reduced speed or is in shutdown mode, it can be forced up one step by using a Push button (impulse). The required number of minutes for the extended operation must be selected on the Systemair Control Panel. Button and cable are not delivered by Systemair. Furthermore when the unit is in shutdown mode it is possible to start/stop the unit by presence detectors. Presence detectors and cable are not delivered by Systemair.

k.6.3 Valve and valve motor for heating coil

The supply voltage for the water valve actuator is 24V AC, the control signal is 0-10 V. The sensor for water temperature has to be installed in the heating coil and the sensor is provided with cable but not connected to the terminals in the cabinet. The cable between valve motor and terminals in the cabinet is not delivered by Systemair. Standard valves are available for 2 or 3-way connection.

k.6.4 Valve and valve motor for cooling coil

The supply voltage for the water valve actuator is 24V AC, the control signal is 0-10 V. Cables between valve motor and terminals in the cabinet are not delivered by Systemair. Standard valves are available for 2 or 3-way connection.

k.6.5 DX cooling

A DX-cooler can be connected to the controller. Input and output are available for:

Start cooling – Alarm cooling – Cooling Y3. Cables are not delivered by Systemair

k.6.6 Circulation pump, heating

Circulation pump is not included in the delivery from Systemair. If the pump has not been activated for 24 hours, the pump is exercised once daily for 1 minute to keep the pump in a good condition. Cables are not delivered by Systemair.

k.6.7 Fire alarm function

k.6.7.1 External fire signal that indicate block or run

The unit is available without components for this function. The controller is as standard configured for ordinary running when the contact is closed (NC). By open contacts the fans stop and the dampers close. If disconnected, fire is indicated and the unit will stop until the signal is re-connected. On the site qualified technicians are able to change the configuration.

k.6.7.2 External fire signal

The unit is delivered without components for this function. The controller is as standard configured for ordinary running when the contact is closed (NC). By open contacts the fans stop and the dampers close. When the unit has been shut down by a fire signal, the unit has to be restarted on the control panel. On the site qualified technicians are able to change the configuration.

k.6.7.3 Two fire thermostats

The unit is available with 2 thermostats installed in the unit – 1 in the extract air and 1 in the supply air. The cut-off temperature in the thermostats is adjustable between 40 and 70°C. At the factory supply is set at 70°C and extract is set at 40°C. The controller is as standard configured to stop the fans and close the dampers if a thermostat is released. On the site qualified technicians are able to change the configuration.

k.6.7.4 One smoke detector in extract air

The smoke detector has been installed in extract air next to the fan. The controller is as standard configured to stop the fans and close the dampers if the detector is released by smoke. When the unit has been shut down by a fire signal, the unit has to be restarted on the control panel. On the site qualified technicians are able to change the configuration.

k.6.8 E tool - configuration tool

The installer can download the PC software called E tool from www.regincontrols.com and this software enables the installer to configure and supervise the function of the system via a graphic interface. This software displays all the parameters to be written in a commissioning report (the commissioning report is available as a Word-file on the CD delivered with the unit). The TCP/IP port in the Corrigo E28 controller is prepared for communication with the E tool software.

k.6.9 Electrical heater battery

k.6.9.1 Control of heating capacity through 0-10 V signal from Systemair control system

Electrical heater installed with separate controller beside the heater. The separate controller is designed for capacity conversion of the 0-10 V control signal from the main control system. The electric heater is not supplied from the air handling unit cabinet as the cabinet is not designed to supply the heater with power. No power supply cables are connected to the electric heater. The separate controller is without supply disconnecting device

k.6.10 Speed control of fans

k.6.10.1 TIME control system – EC motors

Fan motor revolutions are controlled by the EC motors. The EC motors are configured and tested to comply with the data of the unit.

k.6.10.2 Pressure transmitters

Separate control of the air flow or duct pressure for supply fan and for extract fan. The required air flow or duct pressures with normal as well as reduced capacity are selected on the Systemair Control Panel. The actual pressure is measured by pressure transmitters. PI calculation in the controller continuously transmits the necessary revolutions for the fans to achieve the required pressure.

k.6.11 Cabinet

k.6.11.1 Integrated cabinets in TIME units

TIME units are delivered with integrated cabinet in the supply fan section. External components must be connected to terminals in the cabinet.

k.6.12 Temperature sensors

Four sensors are always delivered with each unit. See below where the sensors are placed;

- 1 sensor in the extract air, installed inside the unit
- 1 sensor in the outdoor air, installed inside the unit on the cold side of the heat exchanger
- 1 sensor in the supply air to be placed in the supply air duct by the installer
- 1 sensor in the exhaust, installed inside the unit

k.6.13 Damper motors

Four different types of damper motors are available;

- On/off damper motor, without spring return function. Torque is 20 Nm and run time is 150 seconds
- Modulating damper motor, without spring return function. Torque is 20 Nm and run time is 150 seconds
- On/off damper motor, with spring return function. Torque is 20 Nm and run time is 150/16 seconds
- Modulating damper motor, with spring return function. Torque is 20 Nm and run time is 150/16 seconds

k.6.14 Filter guards

Filter guard over pre-filter and primary filter installed and connected to the controller for display of alarm when the mechanically set limit is exceeded. Filter alarm will be displayed on the Systemair Control Panel.

k.6.15 Room temperature sensors

One or two external room temperature sensors are available. The cabinet has been prepared with additional terminals for connection of the room temperature sensors. The sensors are delivered without cable. The controller calculates an average of the value from the 2 sensors as input for the control.

k.6.16 Frost protection of heating coil.

For the frost protection of the heating coil, the water temperature in the coil is transmitted to the controller by a temperature sensor in a water return circuit of the coil. The controller always generates a signal to the valve motor that keeps a sufficient flow of hot water to protect the coil against frost. This frost protection is also activated when the running mode is "off".

If the water temperature falls below the set point temperature the fans stop, the dampers close, and an alarm is activated.

From Systemair every heating coil for hot water is provided with a little pipe at the collection pipe for the return water. This little pipe is prepared for the installation of the above mentioned temperature sensor for the transmission of the return water temperature to the controller.

k.6.17 Systemair Control Panel - SCP

The separate cable-connected (10m) hand terminal with display and buttons – the Systemair Control Panel is always necessary for the normal handling and programming, because the main Systemair E28 controller is without display and buttons.

k.6.18 Cooling recovery

If the extract air temperature is lower than the outdoor air temperature, and there is a cooling demand in the rooms, the cooling recovery will be activated by reversing the heat exchanger signal. The signal is increased to the cooling recovery by increasing cooling demand.

k.6.19 Free cooling

A temperature sensor has been installed inside the unit in the outdoor air entrance. If the outdoor temperature after midnight is below the room temperature set point and the actual average room temperature is above the set point temperature, the fans start during the summer to cool down the building during night hours.

k.6.20 Alarm signal

By alarm there are 24 V DC on terminals in the cabinet. Lamps and cables are not available from Systemair.

k.6.21 Heat recovery

The heat recovery capacity is controlled by modulating speed of the rotor

k.6.22 Frost protection – plate heat exchanger

Signals from a temperature sensor mounted in the airflow after the plate heat exchanger are transmitted to the controller for frost protection of the plate heat exchanger.

k.7 Commissioning

When the installer has completed the installation and wants to hand over the finished installation to his customer for payment the commissioning protocol can be the written receipt for the full ended job. Fill in the blank spaces and sign the proposed commissioning protocol that is annex 11, or fill in the Word-file with a Commissioning Protocol that is included on the DVD delivered with the unit.

I. Information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted.

I.1 Unit casing.

I.1.1. Design of the machine to make transport safe

Hazards/dangerous area:

Incorrect handling during transportation may cause that the unit is dropped.

Dangerous incident:

If a person is hit by a unit that is dropped, this could lead to irreversible injury or death.

Claim for reduction of danger:

Correct handling during transportation is described in this manual. If lifted by fork-lift truck the forks of the truck must be sufficiently long. Safety measures are also described in this manual by use of crane.

Information about weight of each section is also visible.

I.2 Common for all unit sections

I.2.1 Risk caused by surfaces, edges and corners

Hazards/dangerous area:

Sharp edges on plates might occur inside the machines as well as sharp edges on frames of dampers. No sharp edges on the outside of the units.

Dangerous incident:

Cut fingers/hands.

Claim for reduction of danger:

Risk only exists during maintenance and cleaning. This takes place at least once every year. Use of gloves and helmet is described in this manual. Cut-resistant gloves for protection against injury from sharp metal plate edges. Use CE-marked gloves for this purpose. Lamps mounted inside the unit with sufficient lighting reduce the risk of injury.

I.3 Common for all unit sections by insufficient lighting

I.3.1 Risk caused by insufficient lighting inside sections

Hazards/dangerous area:

On the floors of the units there are handles to hold filters, profiles for the carrying of fan motors. Cables are between fan motors and frequency converters.

Dangerous incident:

By insufficient lighting, the above-mentioned obstacles are not visible with the risk of stumbling that becomes a fall, leading in unfortunate circumstances to irreversible injury or death.

Claim for reduction of danger:

Risk only exists during maintenance and cleaning. This takes place at least once every year. According to this manual and in the SystemairCAD software for configuration and selection of accessories, lamps for sufficient lighting inside the units are mandatory according to the latest interpretations of the Machinery Directive by the authorities. Use of helmets reduces the risk of injury.

I.4 Dampers type DVA – Bypass dampers in DVQ

I.4.1 Risk caused by maintenance and cleaning of dampers

Hazards/dangerous area:

Are between the damper blades and the system of bars and links between motor and damper blades.

Dangerous incident:

Crushing of fingers.

Claim for reduction of danger:

Examination is still under preparation in our own laboratory. Still no voluntary test persons are available.

I.5 Attenuators type DVD

I.5.1 Risk caused by maintenance and cleaning of attenuators

Hazards/dangerous area:

High concentration of dust on the surface of the baffles might be harmful to the health.

Dangerous incident:

To breathe in particles that is harmful to the health.

Claim for reduction of danger:

Risk only exists during maintenance and cleaning. This takes place at least one time every year. Use of particulate respirator is described in this manual. Particulate respirator – maintenance free including foam face-seal and adjustable pre-threaded headbands (same particulate respirator as recommended for change of filters).

I.6 Filters type DVF

I.6.1 Risk caused by missing change of filters

Hazards/dangerous area:

Missing change of filters and missing maintenance decrease the capacity and final consequence will be breakdown.

Dangerous incident:

By extensive lack of filter change and maintenance the machine can break down.

Claim for reduction of danger:

In the manual is the method and schedule for change of filters and maintenance specified.

I.6.2 Risk caused by the execution of filter change

Hazards/dangerous area:

Filter bags

Dangerous incident:

To breathe in particles that is harmful to the health.

Claim for reduction of danger:

Use of particulate respirator – maintenance free including foam face-seal and adjustable pre-threaded headbands (same particulate respirator as recommended for cleaning of attenuators).

I.7 Plug fans type DVE

I.7.1 Risk caused by lightning strike

Hazards/dangerous area:

Lightning strike close to the machine.

Dangerous incident:

Lightning strike can create flash over between phases and conductive parts. This can cause fire or the overvoltage can make injury on persons

Claim for reduction of danger:

Installer and user must be aware of the fact that lightning makes a risk that requires installation of overvoltage protection devices to lead the lightning overvoltage to an earth lead on a safe way. The need for overvoltage protection devices depend on where the unit is placed in and on the building.

Installer and user must take care of this according to local statutory requirements. Overvoltage protection devices are also described in section i.3.3.2 of this manual.

I.7. 2 Risk of rotating impeller caused by stack effect (chimney effect).

Hazards/dangerous area:

On special occasions stack effect – also called chimney effect – in the ducts create airflows that drives the impellers by turned off motors.

Dangerous incident:

Injury of fingers, hands and arms.

Claim for reduction of danger:

Eliminate this airflow for supply air and exhaust air by dampers with spring return motors for automatic closing of the dampers by turned off fan motors and by power failure.

I.8 Batteries for heating and cooling type DVR – DVH – DVK – DVU

I.8.1 Extreme temperatures - heating

Hazards/dangerous area:

Electrical heating elements can achieve surface temperature of 500 degree Celsius.

Batteries and pipes for hot water can achieve 95 degree Celsius.

Dangerous incident:

According to ISO 13732-1:2006, here is no direct risk of burns. (short-time contact – lesser than 2,5 sec).

Claim for reduction of danger:

No.

I.8.2 Extreme temperatures - cooling

Hazards/dangerous area:

Evaporator batteries and pipes connected to cooling compressor can achieve minus 10 degrees Celsius.

Dangerous incident:

According to ISO 13732-1:2006, here is no direct risk of burns. (short-time contact – lesser than 2,5 sec).

Claim for reduction of danger:

No.

I.9 Heat pump units type DVU

I.9.1 Risk of high temperature

Hazards/dangerous area:

Condenser batteries and pipes can achieve temperature of 60 degree Celsius.

Dangerous incident:

Vurderet ud fra ISO 13732-1:2006, der er umiddelbart ikke risiko for forbrændinger. (berøringsstid 2,5 sek).

Claim for reduction of danger:

No.

I.9.2 Risk caused by lightning strike

Hazards/dangerous area:

Lightning strike close to the machine.

Dangerous incident:

Lightning strike can create flash over between phases and conductive parts. This can cause fire or the overvoltage can make injury on persons

Claim for reduction of danger:

Installer and user must be aware of the fact that lightning makes a risk that requires installation of overvoltage protection devices to lead the lightning overvoltage to an earth lead on a safe way. The need for overvoltage protection devices depend on where the unit is placed in and on the building.

Installer and user must take care of this according to local statutory requirements. Overvoltage protection devices are also described in section i.3.3. 2 of this manual

m. Instructions on the protective measures to be taken by all service technicians during repair and maintenance

Use the below-mentioned personal protective equipment for maintenance:

- Cut-resistant gloves for protection against injury from sharp metal plate edges. Use CE-marked gloves for this purpose.
- Helmet
- Particulate respirator – maintenance free including foam face-seal and adjustable pre-threaded headbands – for replacing filters.
- Padlock for locking the automatic circuit breakers in off position
- Lighting inside the units. According to the latest interpretations of the Machinery Directive by the authorities sufficient lighting inside the units is mandatory.
- Tools to block the impeller during repairs and maintenance if stack effect – also called chimney effect – in the ducts create airflows that drives the impellers by turned off motors

n. The essential characteristics of tools which may be fitted to the machinery

The subject in the Machinery Directive about tools on the machine does not exist for the TIME air handling units, because those tools does not exist.

o. The conditions of stability during use, transportation, assembly, dismantling when out of service

The unit must always be handled in an upright position. Never tilt any section more than 15 degrees. If sections must be tilted more than 15 degrees, sections with fans or rotating exchangers that can be drawn out for service must be secured carefully.

During transportation, installation, dismantling or other handling, it must be secured that all components in the unit are properly fastened and with additional attention to the control of anti-vibration mounts under the fans that they are undamaged. The mounting and smooth running of the fans must be controlled and handled with great care.

o.1 Installed reliable to avoid units to be tilted or moved by the any storm.

Units installed on roofs and other places with the risk of heavy winds must be installed reliable to avoid that they can be tilted or moved by the any storm. The base frame is provided with holes that are intended for fastening by sufficient bolts and fittings supplied by the installer.

o.2 Transport of section with heat pump unit

During transportation, the unit section – DVU - **must** always be in the upright position or tilted less than 30°. If it is necessary to tilt the unit more than 30°, the suction pipe of the compressor must point upwards to prevent the escape of oil from the compressor sump.

o.3 Disposal of the heat pump system - type DVU

Prior to the disposal of the DVU unit section, the refrigerant in the heat pump system must be drained off by a skilled technician from a certified company. After correct evacuation of the refrigerant, the disposal of the DVU unit section is similar to the disposal of the rest of the air handling unit.

o.4 General disassembly – sharp edges

Pay attention to several sharp edges during dismantling and disposal of the unit. To avoid injury, CE-marked cut-resistant gloves as well as helmet must be used. The measures are described further in the Maintenance, Dismantling and Disposal Manual.

p. Instructions for machinery where these are regularly to be transported

The subject in the Machinery Directive about machinery that are regularly to be transported does not exist for the TIME and DV air handling units, because those units are for specially made for one intended application.

q. The operating method to be followed in the event of breakdown. Safe restart.

Use the below mentioned procedure in the event of breakdown or blockage:

- Switch off the power and lock the automatic circuit breaker by padlocks in the off position.
- Remove the reason for breakdown or blockage.
- Follow the start-up procedure described in section k.

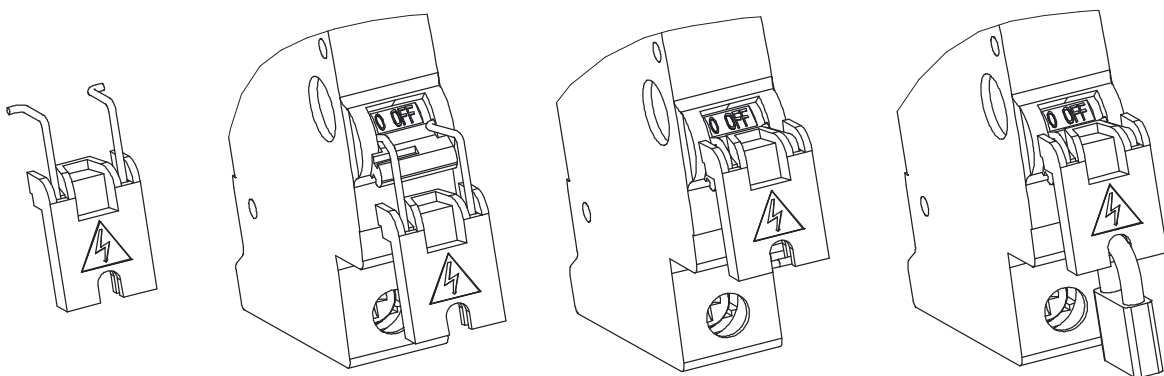
r. Adjustment and maintenance operations

Must be performed by skilled technicians.

In connection with demands for compensation, Systemair must have full and unhindered access to all relevant reporting on service, repair, modification and use since the unit was transferred from Systemair to a transport company at the Systemair factory. It is a condition for compensation that maintenance outlined on the following pages has as a minimum been performed.

r.1 Shutdown of the unit to a safe state.

Switch the unit to OFF on the Systemair Control Panel. See the - Operator's Guide – Annex 15. Switch off the automatic circuit breakers and block them by padlocks. The automatic circuit breakers are marked F1 to F4. See the illustration below about how to place a padlock on each automatic circuit breaker.



Check that the automatic circuit breaker marked F5 is still switched on because the lamps inside the unit, and only those lamps, are connected to this switch. Switch on the lamps for light during the maintenance activities. Lamps is an accessory.

Use the start-up procedure described in section k, when the maintenance activities are completed.

r.2 Recommended maintenance intervals

Function	Maintenance	Number per year
Unit casing	Cleaning of the unit casing.	1
	Control of rubber seals on doors and between sections.	1
Filters	Change on demand by alarm and always minimum twice a year.	2
	Control of rubber seals and locking rails.	2
Fans	Cleaning of all parts.	1
	Check motors and bearings	1
	Check that the impellers are rotating without dissonance.	1
	Check that the unit is operation without vibrations after the cleaning, overhaul and maintenance.	1
Rotary heat exchanger	Check that leakage and dirt accumulation is insignificant	1
	Check that the rotor can turn freely and easily manually with a hand when the belt is removed from the drive	1
Plate heat exchanger	Check bypass function and sequence for de-icing	1
Dampers	Test the operation.	1
	Visual inspection of seals and tightness when closed.	1
Hot water battery	Check the dirt accumulation and clean, if needed.	1
	Bleeding, if needed.	1
	Test of frost protection sequence	1
	Test of cirkulation pump	1
Electric heating battery	Check dirt accumulation and clean, if needed.	1
	Test the function of the system with the fuses for the safety.	1
Cooling battery	Check dirt accumulation and clean, if needed.	1
	Test the frost protection (glycol)	1
Heat pump unit	Mandatory annual control of the heat pump system. Must be done by certified technician from a certified company.	1
Condensate drain	Cleaning of tray, water trap and outlet. Check the electrical heating between insulation and pipes, if installed.	1
Saving- and comfort functions	Test of motion sensor, pressure transmitters for air capacity control, extended operation via button, cooling recovery, free cooling	1
Fire alarm	Test of thermostats, smoke detectors and fire detection systems	1
Battery in controller	Change the battery on demand by alarm in the display and always change the battery as a minimum every 5. Year.	1
Remote control	Test of Communications.	1

r.3. Filters – sizes and numbers

Filters in supply air and in extract air are always the same sizes and the same numbers. See the filters in supply or extract air below. REMEMBER to order filters for supply as well as for extract.

Size of unit	Numbers and sizes of frames for bag filters (WxH)
10	1x[792x392]
15	2x[490x392]
20	1x[490x490] + 1x[592x490]
25	2x[592x592]
30	1x[592x592]+ 1x[490x592] + 1x[287x592]
40	3x[490x742]

NOTE that special sizes of filters are available by Camfil.

r.3.1 Bag filters

Release the bag filter cells by activating the handles and pull out the filter cells of the unit casing. The frame profiles are to be cleaned and all seals checked for damage. The handles and locking guide rails are also to be checked to ensure that they can operate unobstructed. The new filter bags must be pushed carefully into the unit in order to ensure that they are sealed properly. The various filter sizes should be placed in an order corresponding to the way in which the unit is designed, and the filters must have vertical bags.



r.4. Changing the Internal Battery in the controller

Note:

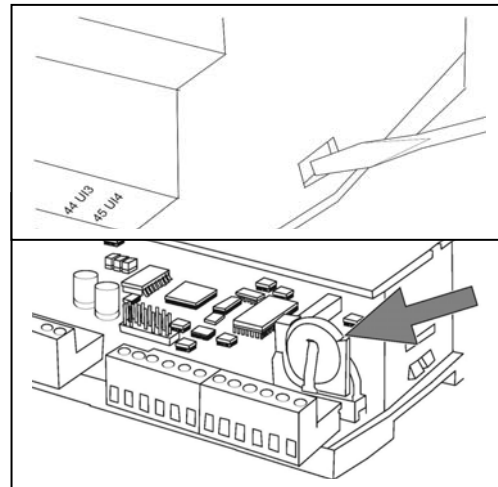
This procedure requires knowledge of proper ESD protection; i.e. an earthed wristband must be used!

When the alarm "Internal Battery" is activated and the battery LED lights up red, the battery for backup of program memory and real-time clock has become too weak. The battery is replaced as described below. A backup capacitor saves the memory and keeps the clock running for at least 10 minutes after the power supply is removed. Therefore, if the battery replacement takes less than 10 minutes, there will be no need to reload the program, and the clock will continue to run normally.

The replacement battery must be of the type CR2032.

Remove the cover by pressing down the locking torques at the edge of the cover using a small screwdriver, and at the same time pulling the edges outwards.

Grip the battery firmly with your fingers and lift it upwards until it rises from its holder. Press the new battery firmly down into place. Note that to preserve correct polarity; the battery can only be inserted the "right way round".



r.5 Other functions to maintain

r.5.1 The unit

The unit should be cleaned once a year when operating with normal air quality for comfort ventilation with no special hygiene requirements.

To clean the unit, dry it off with a dry cloth, or use water mixed with a non-corrosive cleaning medium. Any corrosion i.e. at the filters should be cleaned off immediately, and the surface treated.

In special operating conditions, where the air is aggressive or very humid, for example, or where there are special hygiene requirements, the unit shall be cleaned more frequently as required.

Cleaning medium and method should be adapted to the relevant conditions. Any corrosion should be cleaned off immediately, and the surface treated.

Closing mechanisms are to be lubricated at least once a year. Synthetic door hinges are service free. Seals around inspection doors are to be cleaned at least once a year and are to be checked for leakage.

It is recommended to treat the seals with a moisture repellent agent. Connecting pieces for the unit sections, including the Disc-Lock types, are to be checked for tightness at least once a year.

All seals are to be inspected at least once a year and are to be repaired if necessary.



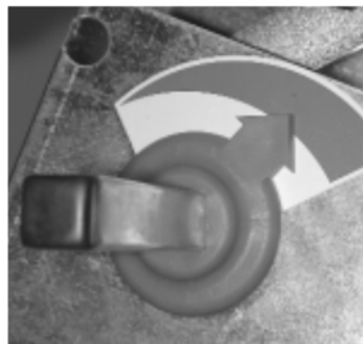
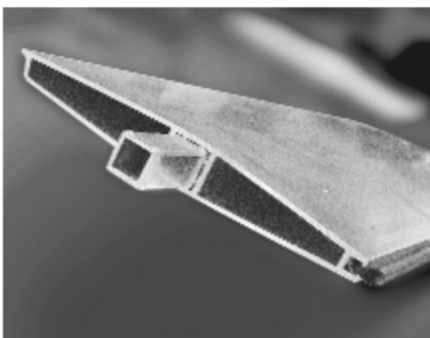
Grilles for air intake and exhaust air outlet are to be cleaned at least once a year to prevent blockage.

r.5.2 Dampers

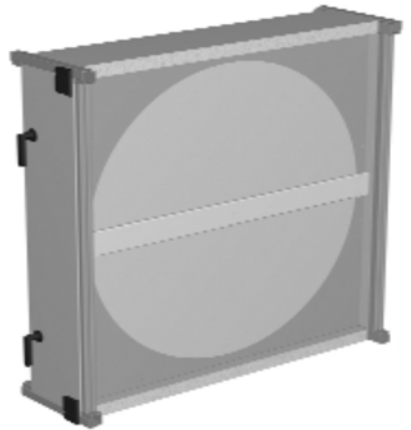
Rubber seals between the damper blades themselves and between the damper blades and the frame are to be checked once a year. These seals are not to be lubricated or treated in any other way.

Each damper blade is connected by a pivoting system. The steel rods and brass bushes do not require lubrication.

The damper blades are fitted with synthetic bearings requiring no lubrication. Air-tightness of the damper, when the damper motor is in the closed position, must be visually checked once a year. The damper motor is to be adjusted if the damper does not close tightly.



r.5.3 Rotary heat exchanger DVC



r.5.3.1 Rotor

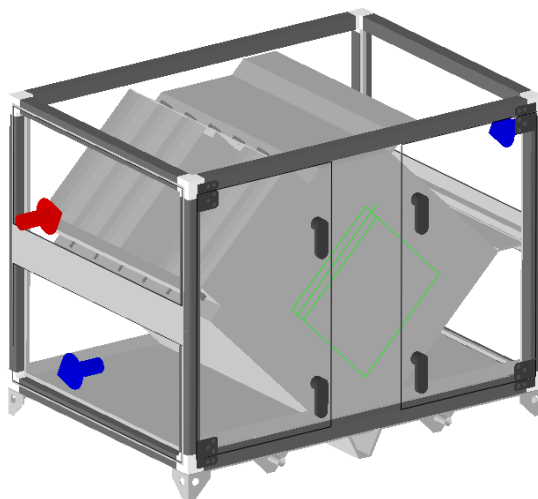
The rotor is to be checked at least once a year to ensure that it can turn freely and easily. This can be done by removing the belt drive at the motor and then turning the rotor manually with a hand on the peripheral rotor casing. At the same time the brush seals are to be checked for damage. The bearings are factory lubricated and do not require any service lubrication. During operation the rotor can become dirty. The rotor can be cleaned by blowing through with compressed air.

To ease inspection and service the rotor can be pulled out of the sizes 10, 15, 20, 25 og 30.

r.5.3.2 Motor and belt drive

The bearings are factory lubricated and do not require any service lubrication. The belt drive is to be checked for correct tightness and that it is undamaged. The rotor is fitted with an elastic belt drive and supplied with a reserve belt on the rotor. This belt drive does not require service and cannot be shortened. A new belt can be fitted using specialist tools.

r.5.4 Counter flow exchanger



Once a year the edges of the heat exchanger plates are to be checked for cleanliness and damage. If there is dust on the edges of the plates, remove it with a soft brush. If grease or other such substances are present, then the edges must be washed using grease dissolving detergents.

r.5.4.1 By-pass damper

The damper blades are fitted with synthetic bearings requiring no lubrication. Each damper blade is connected by a pivoting system. The steel rods and brass bushes do not require lubrication. Air-tightness of the dampers, when the damper motor is in the closed position, must be visually checked once a year. The damper motor is to be adjusted if the damper does not close tightly.

r.5.4.2 Condensate water drain

Once a year clean the drip tray beneath the heat exchanger, as well as the drain and the water trap. Take care that there is sufficient water in the water trap. If a droplet eliminator has been fitted, this must be checked once a year and cleaned if necessary.

r.5.5 Heating coil DVH, cooling coil DVK and change over coil DVHK

After an extended running period (normally a few years) dust particles can accumulate on the surface of the coil. This can reduce the efficiency of the coil. Cleaning must be carried out with the utmost care to ensure that the coil fins are not damaged. The piping system must be vented once a year as air in the system can significantly reduce the capacity of the coil.

r.5.5.1 Heating battery

Check that the frost protection system is fully operational. A battery may burst due to frost if the frost protection system is not operational.

r.5.5.2 Cooling battery

Once a year clean the drip tray beneath the cooling coil, as well as the drain and the water trap. Take care that there is sufficient water in the water trap. If a droplet eliminator has been fitted to the cooling coil, this must be checked once a year and cleaned if necessary.

r.5.5.3 Electric heating battery

Check that the built-in safety thermostat with an automatic reset function and the overheat thermostat with manual resetting are fully operational.



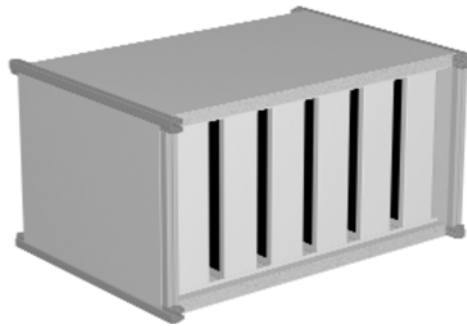
r.5.6 Plug fans DVE

Dust can accumulate on the fan impeller which can cause imbalance and vibrations. The fan impeller must therefore be checked once a year and cleaned, if necessary.

r.5.6.1 Motor

The motor are usually fitted with factory lubricated bearings which require no further lubrication.

r.5.7 Silencer DVD



During operation dust particles can accumulate on the surface of the baffles. Silencers that are designed for dry and wet cleaning are fitted with baffles that can be extracted from the unit casing. Large inspection doors give access to easily extraction of the baffles. Baffles designed for dry cleaning can be cleaned using a soft brush or they can be vacuum cleaned. Baffles designed for wet cleaning can be washed down using a soft brush and soapy water. The detergent used must be non-aggressive. After washing, the baffles must be wiped dry with a cloth. Remember to clean the inside surface of the unit casing before refitting the baffles.

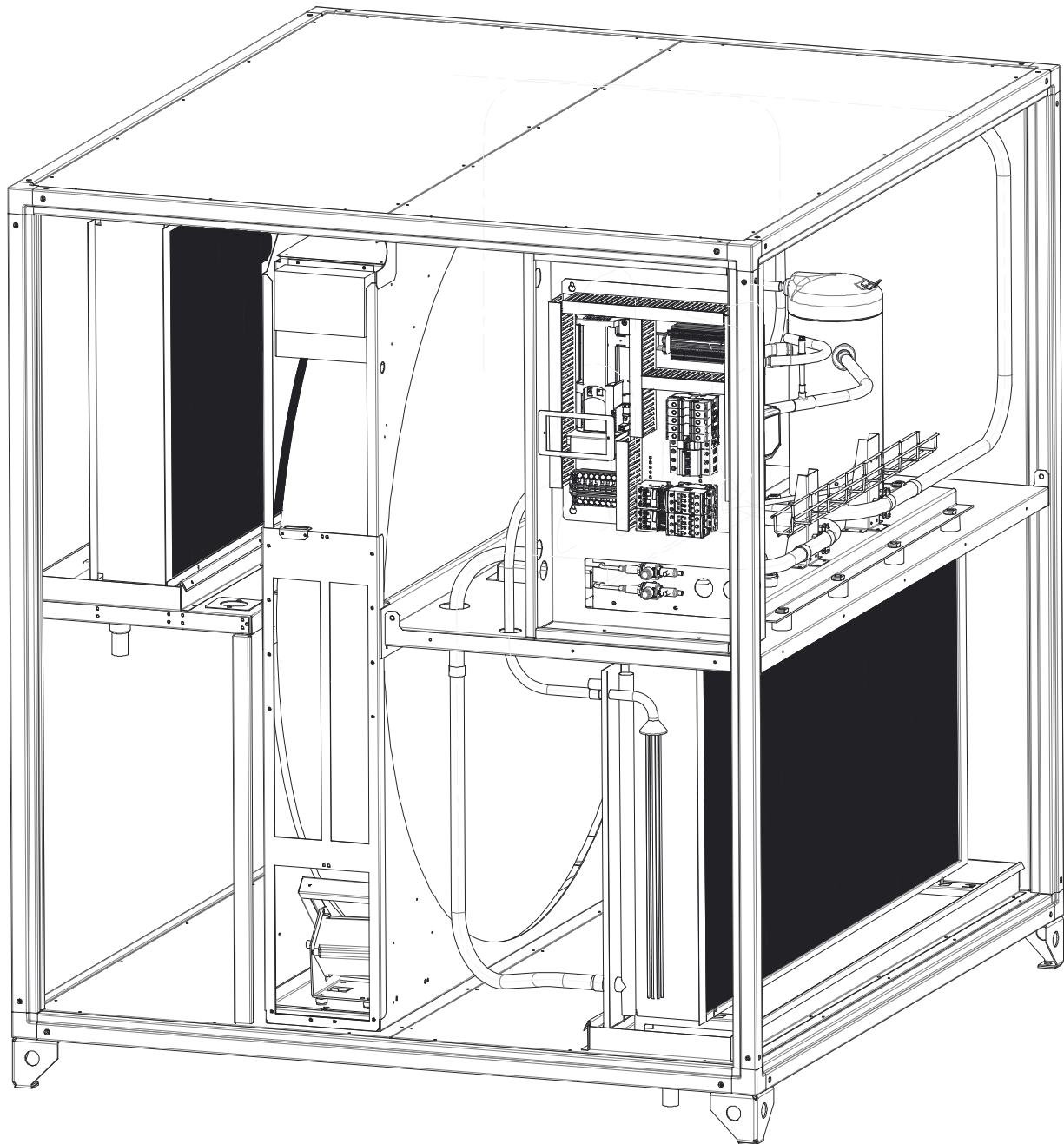
r.5.8 Outdoor air section DVY



Dust and dirt can accumulate in this section. Large inspection doors give access for cleaning.

r.5.9 Heat pump unit – DVU-HP

Mandatory annual control must be done by certified technicians from a certified company. See further description in annex 8 and 9.



s. Instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations

s.1. Protective measures and additional protective measures

Adjustment and maintenance must be done by skilled technicians – usually based on service contracts for some years or long-term ESCO contracts.

The units are provided with guards to avoid unintended hazards and injury because of rotating parts in the unit. The potential sources of harm are the fans with fast rotating impellers. Hazards from the impellers are obvious during operation, but when power is cut-off, the impellers are still potential hazards due to after-run for at least 20 seconds. Notice that even cut-off the impellers are still potential hazards.

The fan guard's are the inspection doors and the doors are provided with locks. Inside the doors are additional protection installed – guards that only can be removed by use of tools.

Other motor-driven parts are dampers with damper motors and rotary heat exchangers, but the movement is so slow that guard measures are not necessary. Just keep your hands away from places with risk of injury. Use particulate respirator when filters are replaced.

s.1.1 Necessary protection measures prior to start-up.

Ensure that all protection measures are installed correct before start-up.

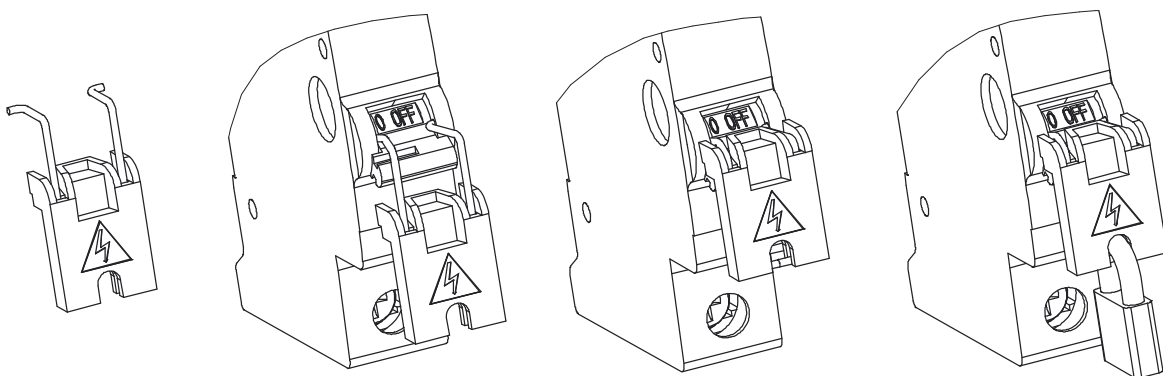
s.1.1.1 Design of protection measures

Inside the doors are additional protection installed – guards that only can be removed by use of tools.

s.1.2 Safe adjustment and maintenance

Before maintenance and repair, the unit must be switched off by switching off the automatic circuit breakers and block them by padlocks. See the illustration below about how to place a padlock on each automatic circuit breaker. **Note that lamps must be switched on during maintenance** (lamps are an accessory – only installed, if ordered).

Use cut-resistant gloves for protection against injury from sharp metal plate edges. Use CE-marked gloves for this purpose. Use helmet during maintenance work in the unit.



s.1.3 Personal protective equipment for maintenance staff – health and safety

Use the below-mentioned personal protective equipment for maintenance:

- Cut-resistant gloves for protection against injury from sharp metal plate edges. Use CE-marked gloves for this purpose.
- Helmet
- Particulate respirator – maintenance free including foam face-seal and adjustable pre-threaded headbands – for replacing filters.
- Padlock for locking the above mentioned automatic circuit breakers.

t. The specifications of the spare parts to be used, when these affect the health and safety of operators

TIME units are operating automatically. Operators can control the unit by the Systemair control panel.

t.1 Spare parts - Mechanical

Annex 3 - available on demand

t.2 Spare parts - Electrical

Annex 3 – available on demand

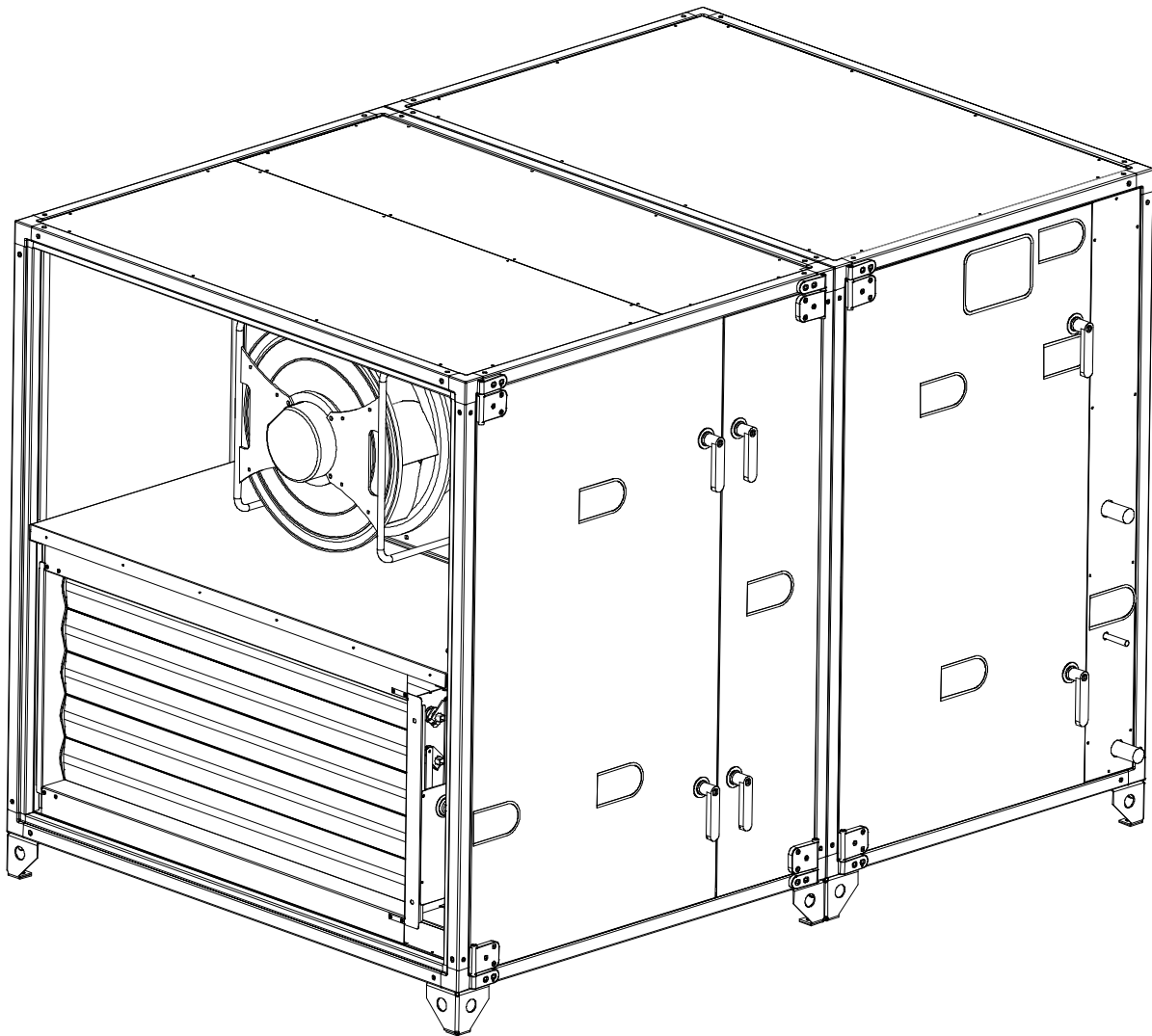
u. Information on airborne noise emissions exceeding 70 dB(A)

Due to the design and construction of the units the (A) weighed sound pressure level from fans and other components do not exceed 70 dB (A) outside the units

Annex for the User Manual

Air Handling Units

TIME



Version 1.01.06

Overview of annexes

Annexes 1, 2, 3, 11, 12 and 15 are enclosed in a separate cover.

Annex 1 Declaration of conformity with unique production number

Printed on separate page and delivered with every unit. Enclosed in separate cover.

Annex 2 Technical data – unique data for every unit

Printed on separate pages and delivered with every unit. Enclosed in separate cover.

Annex 3 spare part lists

Printed on separate pages but not delivered with every unit. Available on demand.

Annex 4 Assemble base frames – height 150 mm for units in the sizes 10-40

Annex 5 Assemble base frames – height 250 mm for units in the sizes 10-40

Annex 6 Installation of steel roof in the sizes 10- 40

Annex 7 Rotary exchanger – speed control

Annex 8 Heat pump unit – DVU-HP

Annex 9 Menu for internal controller in the heat pump unit

Annex 10 Connection of fan motors

Annex 11 Commissioning protocol – proposal (receipt for hand-over)

Printed on separate pages and delivered with every unit. Enclosed in separate cover

Annex 12 Report with data from the final functional test on the Systemair factory

Printed on separate pages and delivered with every unit. Enclosed in separate cover.

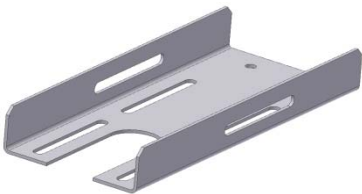
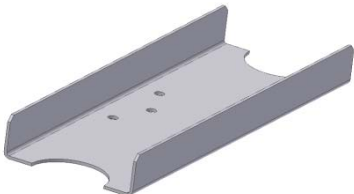
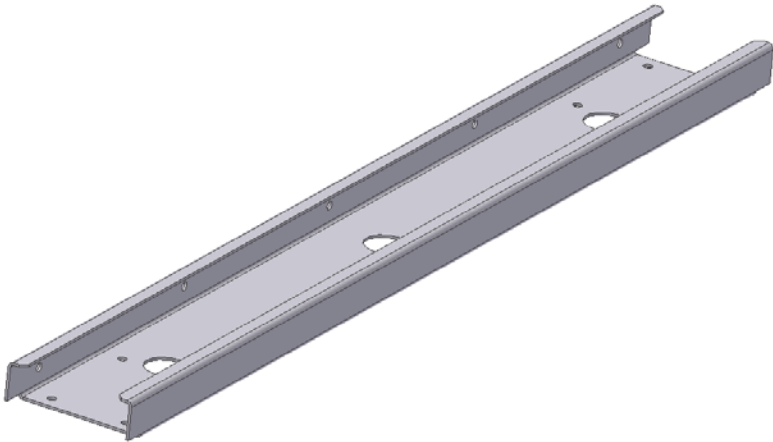
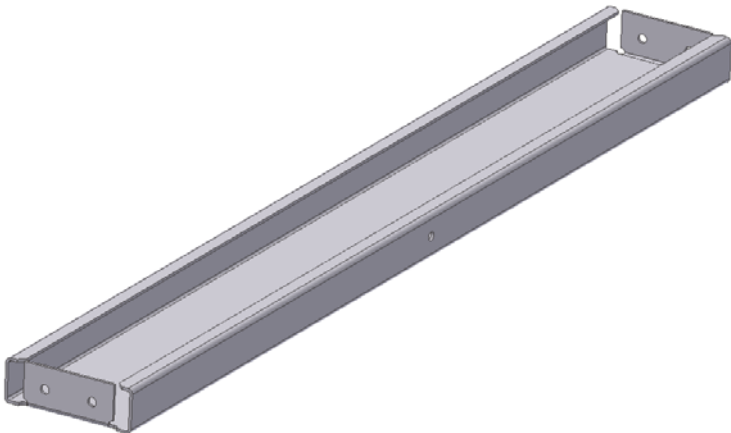
Annex 13 Short description of main components in control system

Annex 14 Wiring diagram

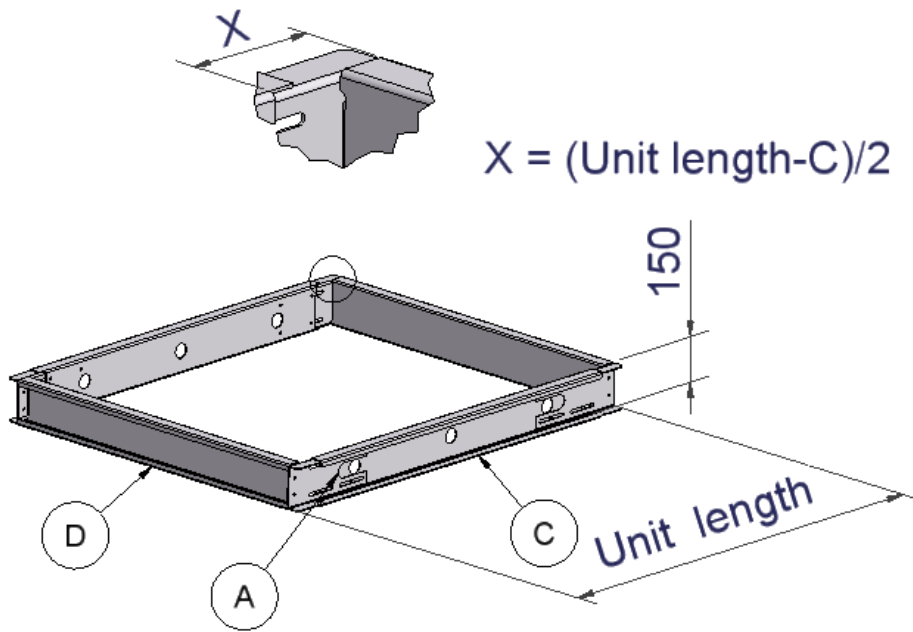
Annex 15 Operator's guide (how to use the Systemair control panel)

A separate manual is delivered with every unit. This manual assists the everyday user/operator about how to control the unit by navigating the menus by the buttons and the display. Enclosed in separate cover.

Annex 4. Assemble base frames – height 150 mm for units sizes 10-40

<p>A = Corner</p> 	<p>B = Splice</p> 
<p>C = Length profile</p> 	
<p>D = Width profile</p> 	

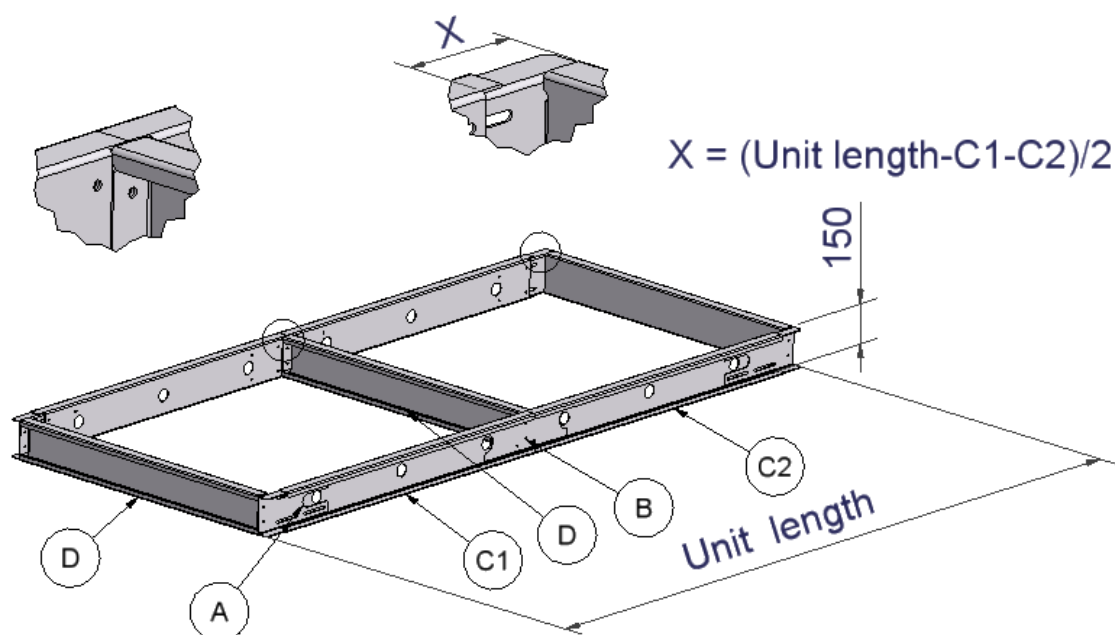
4.1 Base frame length 720 – 2420 [mm] Unit size 10-40



Width profile type D		
Unit size	Quantity	Length [mm]
DV-10	2	876
DV-15	2	1026
DV-20	2	1176
DV-25	2	1326
DV-30	2	1476
DV-40	2	1626

C		A	
Frame length [mm]	Quantity	Length [mm]	Quantity
700-770	2	520	4
770-920	2	670	4
920-1070	2	820	4
1070-1220	2	970	4
1220-1370	2	1120	4
1370-1520	2	1270	4
1520-1670	2	1420	4
1670-1820	2	1570	4
1820-1970	2	1720	4
1970-2120	2	1870	4
2120-2270	2	2020	4
2270-2420	2	2170	4

4.2 Base frame length 2420 – 4590 [mm] Unit size 10-40

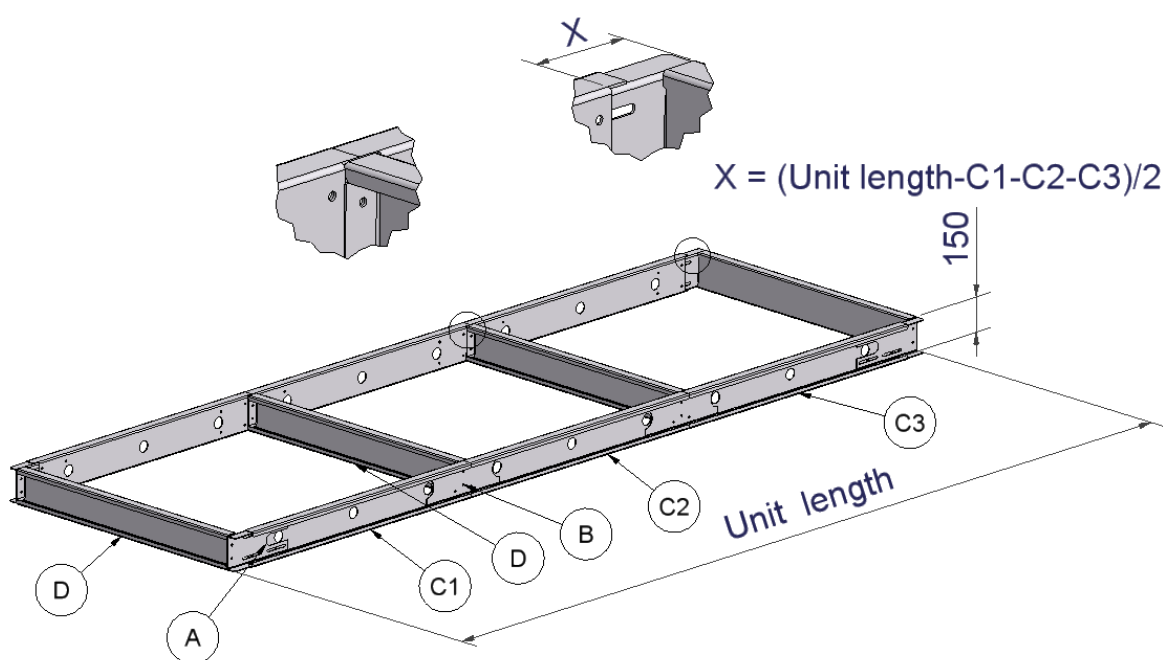


Width profile type D

Unit size	Quantity	Length [mm]
DV-10	3	876
DV-15	3	1026
DV-20	3	1176
DV-25	3	1326
DV-30	3	1476
DV-40	3	1626

C1			C2		A	B
Frame length [mm]	Quantity	Length [mm]	Quantity	Length [mm]	Quantity	Quantity
2420-2570	2	1120	2	1200	4	2
2570-2640	2	1270	2	1200	4	2
2640-2790	2	1270	2	1270	4	2
2790-2940	2	1270	2	1420	4	2
2940-3090	2	1420	2	1420	4	2
3090-3240	2	1420	2	1570	4	2
3240-3390	2	1570	2	1570	4	2
3390-3540	2	1570	2	1720	4	2
3540-3690	2	1720	2	1720	4	2
3690-3840	2	1720	2	1870	4	2
3840-3990	2	1870	2	1870	4	2
3990-4140	2	1870	2	2020	4	2
4140-4290	2	2020	2	2020	4	2
4290-4440	2	2020	2	2170	4	2
4440-4590	2	2170	2	2170	4	2

4.3 Base frame length 4590 – 6200 [mm] Unit size 10-40

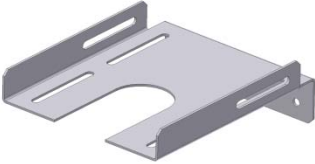
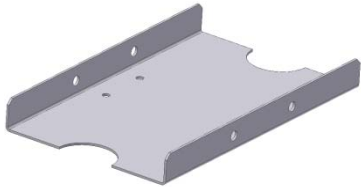
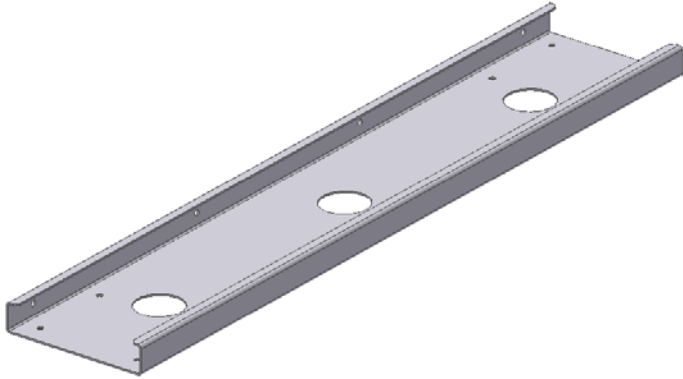
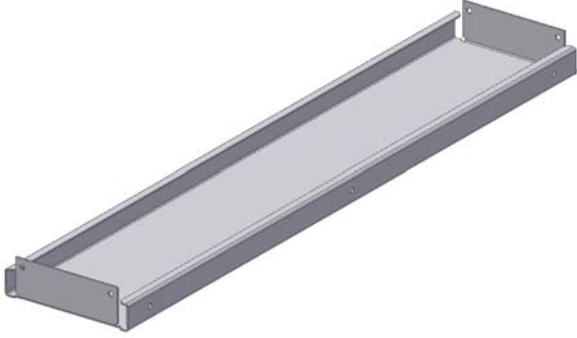
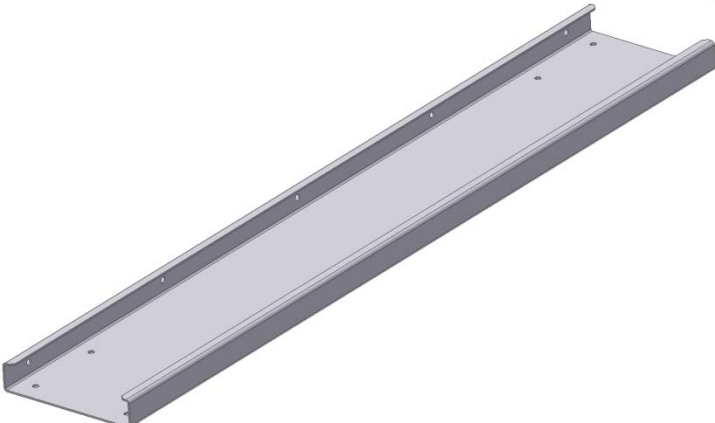


Width profile type D

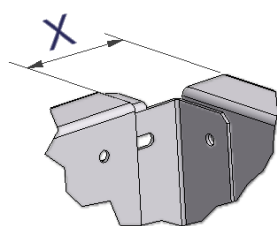
Unit size	Quantity	Length [mm]
DV-10	4	876
DV-15	4	1026
DV-20	4	1176
DV-25	4	1326
DV-30	4	1476
DV-40	4	1626

C1			C2		C3		A	B
Frame length [mm]	Quantity	Length [mm]	Quantity	Length [mm]	Number	Length [mm]	Qty	Qty
4590-4740	2	1420	2	1500	2	1570	4	4
4740-4890	2	1570	2	1570	2	1500	4	4
4890-5040	2	1720	2	1500	2	1570	4	4
5040-5110	2	1720	2	1720	2	1500	4	4
5110-5260	2	1720	2	1720	2	1570	4	4
5260-5410	2	1720	2	1720	2	1720	4	4
5410-5560	2	1870	2	1720	2	1720	4	4
5560-5710	2	1870	2	1870	2	1720	4	4
5710-5860	2	1870	2	1870	2	1870	4	4
5860-6010	2	2020	2	1870	2	1870	4	4
6010-6160	2	2020	2	2020	2	1870	4	4
6160-6200	2	2020	2	2020	2	2020	4	4

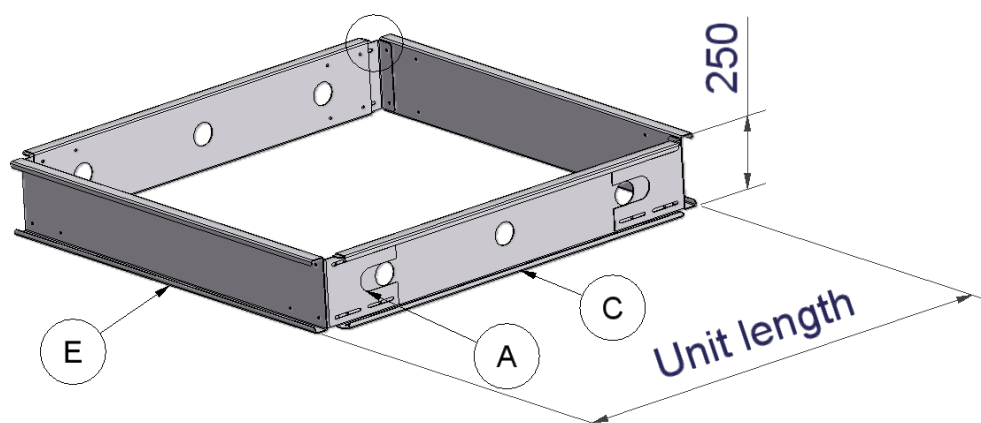
Annex 5. Assemble base frames – height 250 mm for units sizes 10-40

<p>A = Corner</p> 	<p>B = Splice</p> 
<p>C = Length profile</p> 	
<p>D = Spacer profile</p> 	
<p>E = Width profile</p> 	

5.1 Base frame length 720 – 2420 [mm] Unit size 10-40



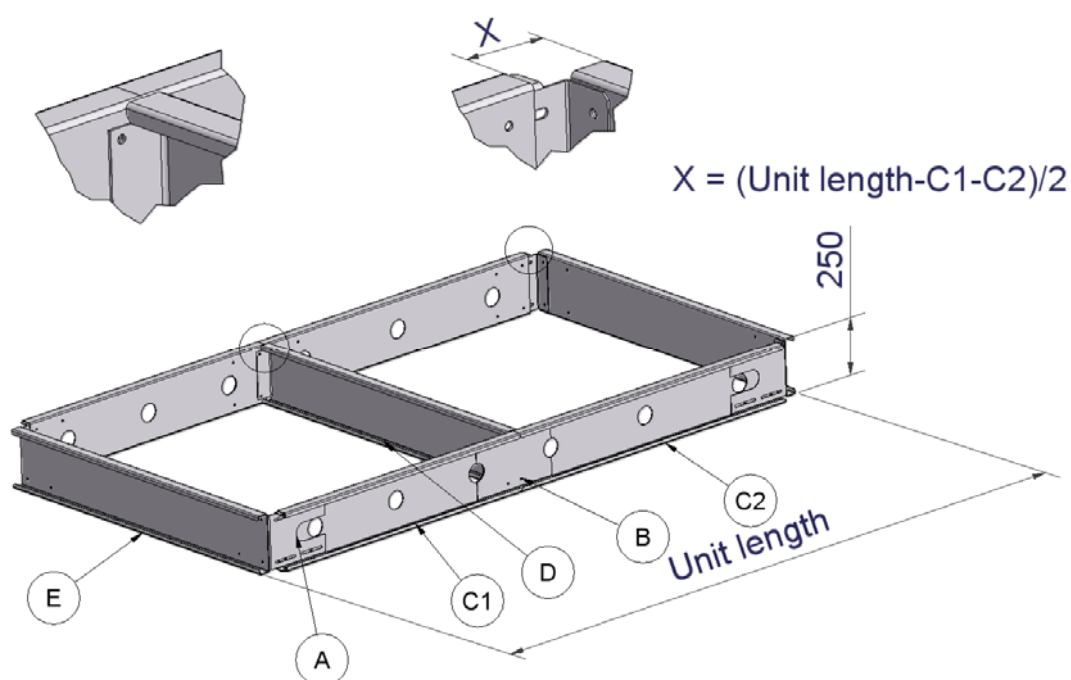
$$X = (\text{Unit length} - C) / 2$$



Width profile type E		
Unit size	Quantity	Length [mm]
DV-10	2	870
DV-15	2	1020
DV-20	2	1170
DV-25	2	1320
DV-30	2	1470
DV-40	2	1620

		C	A
Frame length [mm]	Quantity	Length [mm]	Quantity
700-770	2	520	4
770-920	2	670	4
920-1070	2	820	4
1070-1220	2	970	4
1220-1370	2	1120	4
1370-1520	2	1270	4
1520-1670	2	1420	4
1670-1820	2	1570	4
1820-1970	2	1720	4
1970-2120	2	1870	4
2120-2270	2	2020	4
2270-2420	2	2170	4

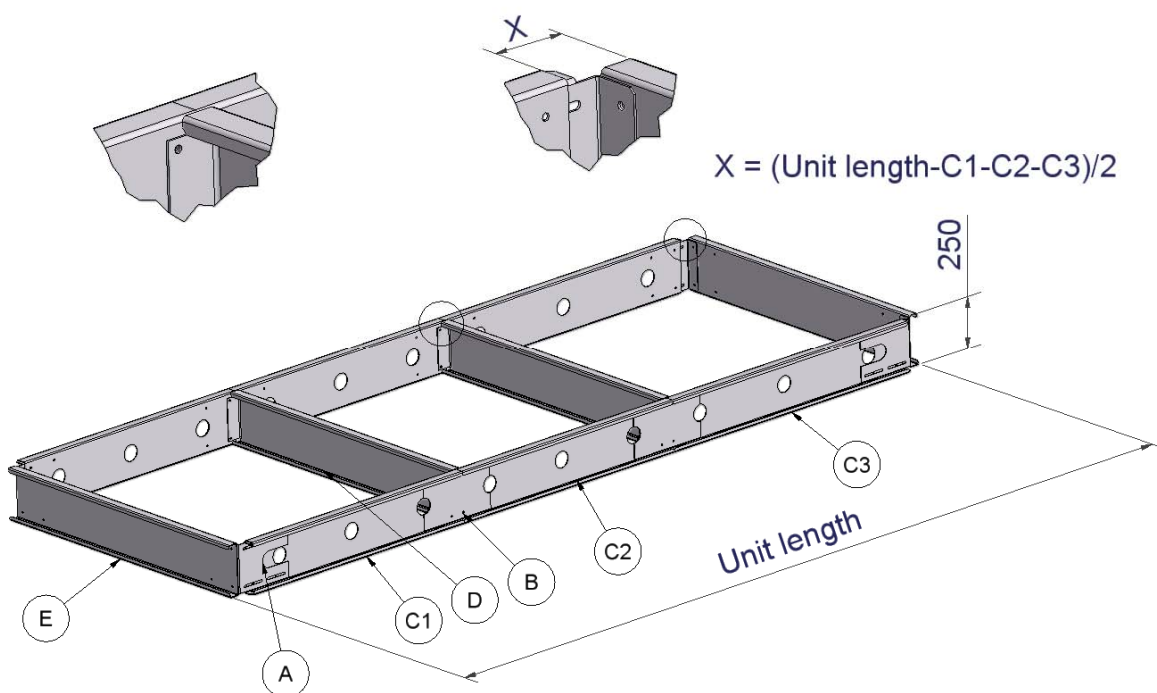
5.2 Base frame length 2420 – 4590 [mm] Unit size 10-40



Width profile type E			Spacer profile type D
Unit size	Quantity	Length [mm]	Length [mm]
DV-10	2	870	870
DV-15	2	1020	1020
DV-20	2	1170	1170
DV-25	2	1320	1320
DV-30	2	1470	1470
DV-40	2	1620	1620

		C1		C2		A	B	D
Frame length [mm]	Quantity	Length [mm]	Quantity	Length [mm]	Qty	Qty	Qty	
2420-2570	2	1120	2	1200	4	2	1	
2570-2640	2	1270	2	1200	4	2	1	
2640-2790	2	1270	2	1270	4	2	1	
2790-2940	2	1270	2	1420	4	2	1	
2940-3090	2	1420	2	1420	4	2	1	
3090-3240	2	1420	2	1570	4	2	1	
3240-3390	2	1570	2	1570	4	2	1	
3390-3540	2	1570	2	1720	4	2	1	
3540-3690	2	1720	2	1720	4	2	1	
3690-3840	2	1720	2	1870	4	2	1	
3840-3990	2	1870	2	1870	4	2	1	
3990-4140	2	1870	2	2020	4	2	1	
4140-4290	2	2020	2	2020	4	2	1	
4290-4440	2	2020	2	2170	4	2	1	
4440-4590	2	2170	2	2170	4	2	1	

5.3 Base frame length 4590 – 6200 [mm] Unit size 10-40



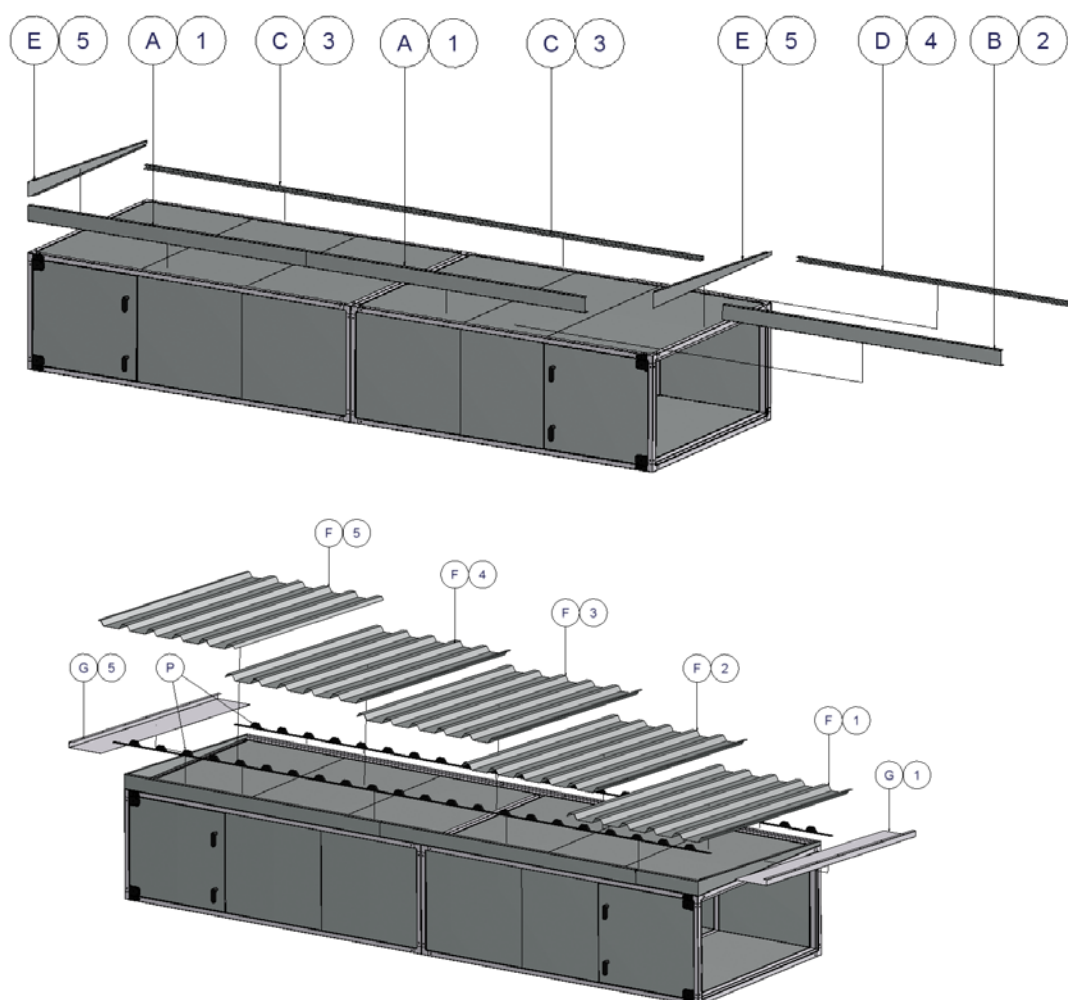
Width profile type E			Spacer profile type D
Unit size	Quantity	Length [mm]	Length [mm]
DV-10	2	870	870
DV-15	2	1020	1020
DV-20	2	1170	1170
DV-25	2	1320	1320
DV-30	2	1470	1470
DV-40	2	1620	1620

C1		C2		C3		A	B	D	
Frame length [mm]	Qty	Length [mm]	Qty	Length [mm]	Qty	Length [mm]	Qty	Qty	Qty
4590-4740	2	1420	2	1500	2	1570	4	4	2
4740-4890	2	1570	2	1570	2	1500	4	4	2
4890-5040	2	1720	2	1500	2	1570	4	4	2
5040-5110	2	1720	2	1720	2	1500	4	4	2
5110-5260	2	1720	2	1720	2	1570	4	4	2
5260-5410	2	1720	2	1720	2	1720	4	4	2
5410-5560	2	1870	2	1720	2	1720	4	4	2
5560-5710	2	1870	2	1870	2	1720	4	4	2
5710-5860	2	1870	2	1870	2	1870	4	4	2
5860-6010	2	2020	2	1870	2	1870	4	4	2
6010-6160	2	2020	2	2020	2	1870	4	4	2
6160-6200	2	2020	2	2020	2	2020	4	4	2

Annex 6. Installation of steel roof in the sizes 10- 40

6.1 Overview

- Mount rails A1, B2, C3, D4, E5 on the unit for support of trapezoidal roof plates (mount also rails Y and Z on units of the size 30 and on units that are larger than size 30 longitudinally at the centre-line of the units).
- Place foam bands – P – on the horizontal rails A1, B2, C3 and D4 for support of roof plates.
- Calculate overhang of the roof at both ends of the unit and mount roof overhang profile – G1 on the first trapezoidal roof plate – F1 before the roof plate is mounted.
- Place and mount roof plates F1, F2, F3 and so on.
- Remember foam bands on the side laps between roof plates to prevent rainwater from passing through.
- Place roof overhang profile – G5 at the other end of the unit before the last roof plate is mounted.
- Mount sides and corners on the roof.
- Apply sealing where plates are joined to ensure water resistance - even in stormy weather.



6.1.1 Mount rails. Units of size 10, 15, 20, and 25

Squeeze sealant in sufficient quantity between the underside of the rails A1, B2, C3, D4, E5 and the horizontal top side of the unit before the rails are mounted. This means that the rails are standing on

sealant to achieve the tightest connection between rails and unit to prevent rainwater from passing under the rails and into the unit. Mount the rails A1 and B2 on the front side (the side with the inspection doors) – use the simple self-drilling screws without the sealing washer – see the illustration of the screw below.



Note: Rail B2 fits into the rail A1, and this offers the advantage that the rail B2 can be slid inside the rail A1 to adjust the length of rail B2 accurately to the length of the unit. In this way it is not necessary to spend time and effort cutting the rail B2.

Mount the lower rails C3 and D4 on the back side of the unit.

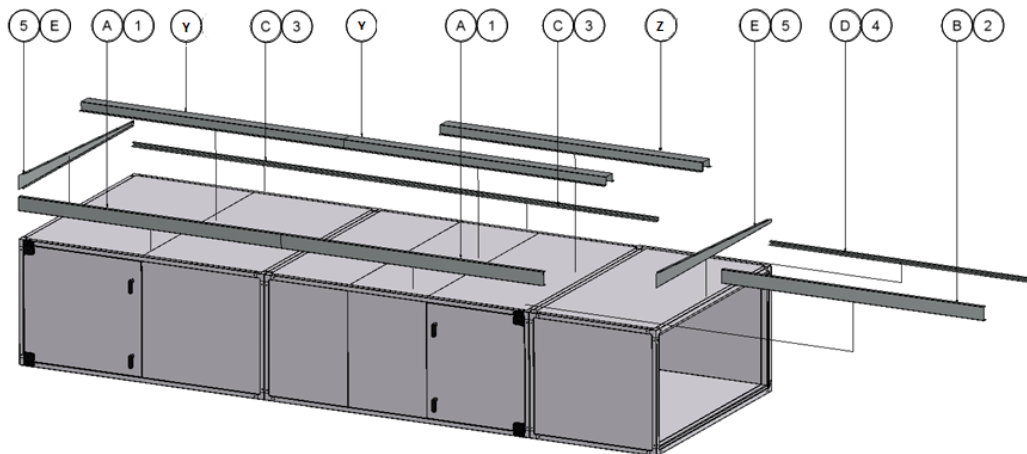
Note: Rail D4 fits into the rail C3, and this offers the advantage that the rail D4 can be slid inside the rail C3 to adjust the length of rail D4 accurately to the length of the unit. In this way it is not necessary to spend time and effort on cutting the rail D4.

Mount vertical rail – E5 - with the roof slope at each end of the unit

It is important to place a screw in each hole – even though the number of holes for screws seems to be very large, a screw in each hole is necessary as the stress on the roof during stormy weather is extremely high.

6.1.2 Mount rails. Units of size 30 and 40.

On units of size 30 and 40, rails A1, B2, C3, D4, E5 must be mounted on the unit for support of trapezoidal roof plates, but also rails Y and Z must be mounted longitudinally at the centre-line of the units to hold the trapezoidal roof plates.



Squeeze sealant in sufficient quantity between the underside of the rails A1, B2, C3, D4, E5 and the horizontal top side of the unit before the rails are mounted. This means that the rails are standing on sealant to achieve the tightest connection between rails and unit to prevent rainwater from passing under the rails and into the unit. Mount the rails A1 and B2 on the front side (the side with the inspection doors) – use the simple self drilling screws without the sealing washer – see the illustration of the screw below.



Note: Rail B2 fits into the rail A1, and this offers the advantage that the rail B2 can be slid inside the rail A1 to adjust the length of rail B2 accurately to the length of the unit. In this way it is not necessary to spend time and effort cutting the rail B2.

Mount the lower rails C3 and D4 on the back side of the unit.

Note: Rail D4 fits into the rail C3, and this offers the advantage that the rail D4 can be slid inside the rail C3 to adjust the length of rail D4 accurately to the length of the unit. In this way it is not necessary to spend time and effort cutting the rail D4.

Mount vertical rail – E5 - with the roof slope at each end of the unit.

Mount the rails Y and Z on the unit with the centre-line of the rails exactly over the centre-line of the unit. It is longitudinal on the middle of the units to hold the trapezoidal roof plates.

Notice, that rail Z fits over the lower rail Y, and this offers the advantage that the rail Z can be slid on the rail Y to adjust the length of rail Z accurately to the length of the unit. In this way it is not necessary to spend time and effort on cutting the rail Z.

It is important to place a screw in each hole – even though the number of holes for screws seems to be very large, a screw in each hole is necessary as the stress on the roof during stormy weather is extremely high.

6.1.3 Roof overhang along the long sides of the unit

The roof plates are longer than the width of the unit to ensure sufficient overhang along the sides of the unit.

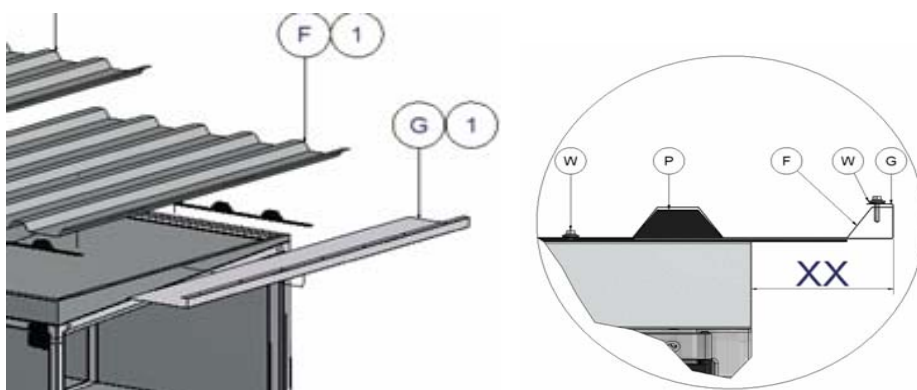
The overhang is 100 mm along each side of the smallest unit – size 10.

The overhang is 150 mm along each side of the units – size 15, 20, 25.

The overhang is 175 mm along each side of the biggest units – including size 30.

6.1.4 Calculation of the overhang at the ends of the unit. Mount overhang profile – G1.

The roof must be between 200 and 400 mm longer than the length of the unit to secure a roof overhang between 100 mm and 200 mm at the each of the 2 ends of the unit, and the length of this overhang must be calculated before the first roof plate is mounted.



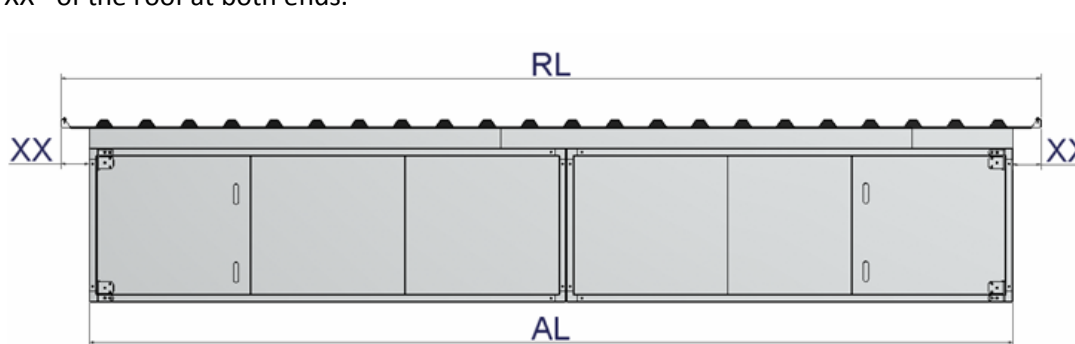
The unit is delivered with 2 similar overhang profiles - G1 and G5 - one for each end of the roof. Mount one of the 2 roof overhang profiles – G on a trapezoidal roof plate. Use the self drilling, painted screws with sealing washers - W - see the illustration.

Note: Foam bands - P – are necessary between the overhang profile G1 and the roof plate F1. See the illustration.



Self-drilling, painted screws supplied with sealing washer for the mounting of the trapezoidal plate to the roof overhang profile.

The total cover width of the trapezoidal roof plates always changes with the pitch of 205 mm between the trapezoidal ribs, making up a total length of the complete roof of - for example 2100 mm, 2305 mm, 2510 mm and so on. We call this length of the total roof for RL and we call the total length of the complete unit for AL. The trapezoidal roof must always be longer than the unit, to obtain a reasonable overhang called – XX - of the roof at both ends.



In the table below you will find 40 different lengths of roofs (always changing with the 205 mm) and the lengths of units that are ideal for each of the 40 alternative roof lengths.

Measure the total length – AL of the unit – for example 5000 mm between the 4982 and 5182 mm mentioned in the table below.

AHU length AL	Roof length RL
1670 – 1870	2100
1877 – 2077	2305
2084 – 2284	2510
2291 – 2491	2715
2498 – 2698	2920
2705 – 2905	3125
2912 – 3112	3330
3119 – 3319	3535
3326 – 3526	3740
3533 – 3733	3945
3740 – 3940	4150
3947 – 4147	4355
4154 – 4354	4560
4361 – 4561	4765

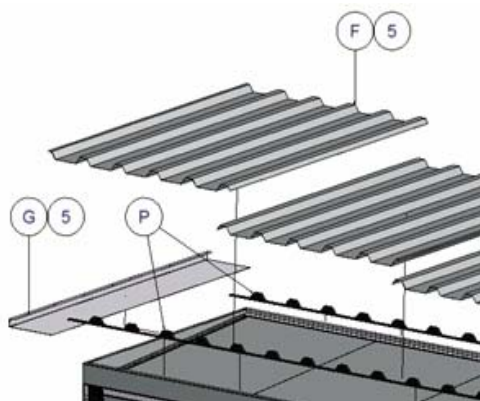
AHU length AL	Roof length RL
4568 – 4768	4970
4775 – 4975	5175
4982 – 5182	5380
5189 – 5389	5585
5396 – 5596	5790
5603 – 5803	5995
5810 – 6010	6200
6017 – 6217	6405
6224 – 6424	6610
6431 – 6631	6815
6638 – 6838	7020
6845 – 7045	7225
7052 – 7252	7430
7259 – 7459	7635

AHU length AL	Roof length RL
7466 – 7666	7840
7673 – 7873	8045
7880 – 8080	8250
8087 – 8287	8455
8294 – 8494	8660
8501 – 8701	8865
8708 – 8908	9070
8915 – 9115	9275
9122 – 9322	9480
9329 – 9529	9685
9536 – 9736	9890
9743 – 9943	10095

The mentioned length of roof – RL - for this length of unit is 5380 mm (the delivered trapezoidal plates can be combined to this length - RL = 5380 mm). 5380 mm minus 5000 mm is 380 mm overhang for both ends, and $380/2 \text{ mm} = 190 \text{ mm}$ is the overhang for each end. Place the trapezoidal roof plate F1 with the roof overhang profile G1 on rail E with an overhang of 190 mm.

6.1.5 Foam bands between rails and roof plates – mount roof plates.

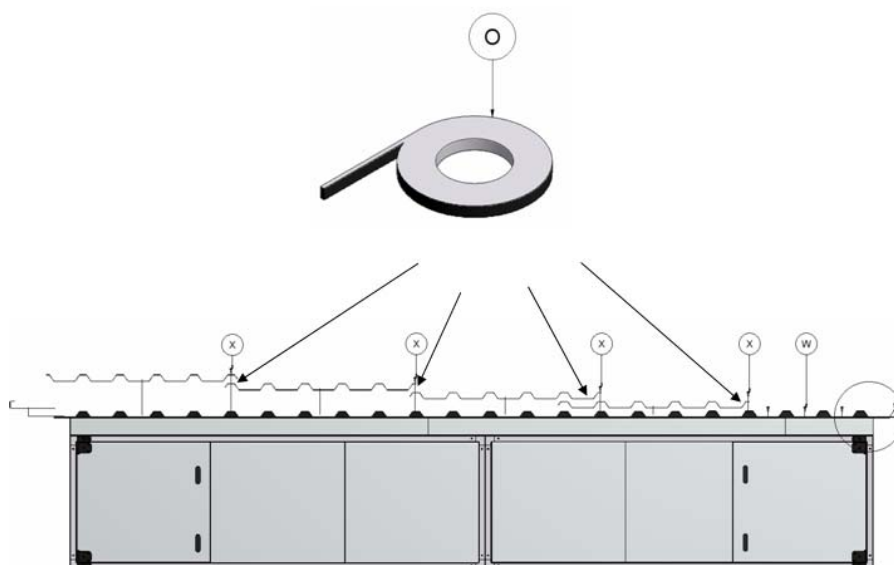
Place foam bands P between profiles A1, B2, C3, D4 and roof plates.



The trapezoidal roof plates are mounted with the self-drilling, painted screws supplied with sealing washer.

6.1.6 Foam bands between roof plates

Mount the self-adhesive foam band – O - on the underlapping rib for water resistant and effective sealing due to the small slope of the roof.

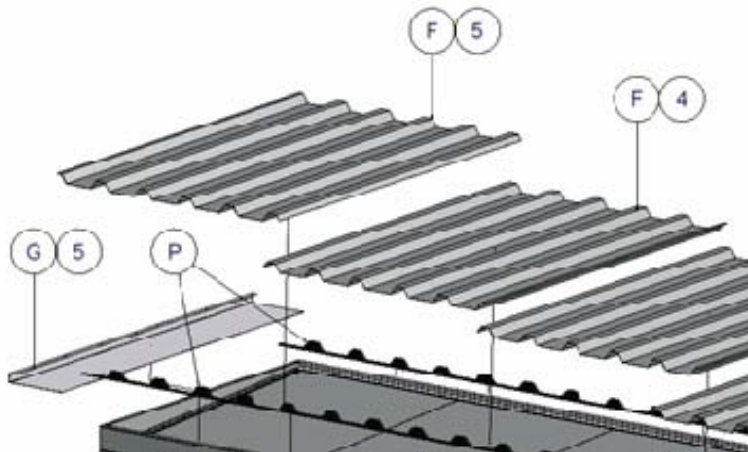


6.1.7 Mount roof plates – some of them are overlapping by 2 ribs

The width of each plate is always 1025 mm and some of the plates have to overlap by 2 ribs to achieve the optimal total length of the whole roof — see the illustration above.

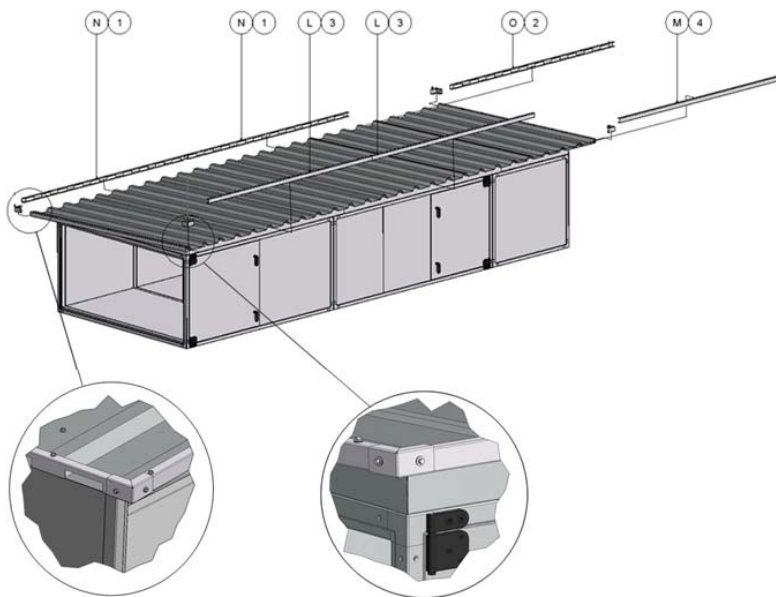
6.1.8 Mount overhang profile – G5 on the other end of the unit.

When the last trapezoidal plate (in this example F5) has been placed on the unit, the second roof overhang profile G5 must be pushed under the trapezoidal roof plate and mounted with the self-drilling, painted screw with sealing washer. Mounting must be similar to the mounting of roof overhang profile under the trapezoidal roof plate at the other end of the unit.



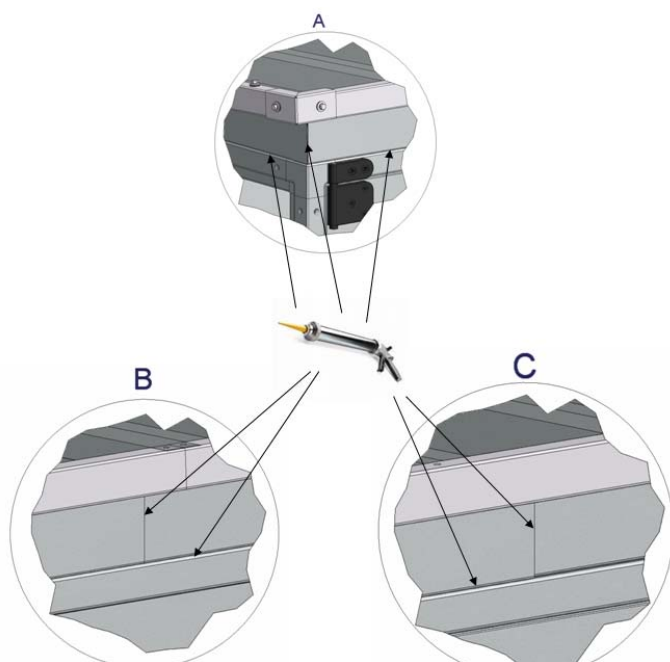
6.1.9 Mount side profiles and corners along the edges of the roof to protect persons

Profiles N and O with the rectangular holes are for the long and lower side of the roof because rain can escape through the holes. Mount the profiles type N first and the profile O last because the profile O goes over the profile N. Mounted in this order, the profile O can match the end of the roof and the surplus length of the profile O will just cover part of the previous profile N. Mount the profiles L and M along the long and higher front side of the roof. Mount the 4 protection corners.



6.1.10 Apply sealing on plate joints to ensure water resistance.

Finish installation of the steel roof by sealing all plate joints with silicone to prevent rainwater from passing into the unit. See examples below of joints to be sealed.



Annex 7. Speed control for rotor

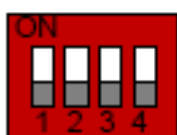
7.1 Speed control

The cabinet with the speed control system for the rotor is installed behind the inspection door in the rotor section.

The cabinet contains the speed controller with all components, terminal blocks, LED displaying the operation mode, the dual position DIP switch with 4 sliding levers for programming the rotor motor signal and a button for the activation of the test mode.

Through the different combinations of the 4 sliding levers of this dual position DIP switch, the correct signal is available for the different motors used for the air handling units. The sliding levers are set and the function is checked at the factory. The positions of the levers appear from the tables below.

7.1.1 Selection of correct signal via the 4 DIP switch levers



The 4 DIP switch levers

Position	Function	Code
Up	Active = ON	1
Down	Deactivated = OFF	0

The factory sets the positions of the 4 DIP switch levers for the maximum of 10 revolutions per minute for standard temperature exchangers and for hygroscopic exchangers. The position of each DIP switch lever is shown below.

TIME	Diameter of pulley	DIP switch position	Motor
10	50	0000	90TYD-S214-M 2.8Nm
15	50		
20	50		
25	65		
30	65		
40	65	1000	

The factory sets the positions of the 4 DIP switch levers for the maximum of 20 revolutions per minute for sorption exchangers. The position of each DIP switch lever is shown below.

TIME	Diameter of pulley	DIP switch position	Motor
10	50	1000	90TYD-S214-M 2.8Nm
15	87	0100	120TYD-S214-M 5.5Nm
20	87		
25	107		
30	107		
40	107	1100	

7.1.2 Indication of operation mode via red and green LED as well as test of motor

The LED is in the cover of the cabinet.

LED indication	Value
No indication	Power off
Green	Ordinary operation
Green – flashes	Ready for operation
Constant green and red indication for activated rotor guard	Magnet on the rotor has activated rotor guard
Constant green and fast red flashes	Restart sequence active
Red	Rotor guard has not been activated

Number of red flashes in series	Value
1	Output current limit
2	Over voltage
3	Under voltage
4	Failure in the controller
5	Communication failure

Restart of rotor:

- Switch off power and switch on power again
or
- Press the test button inside the cabinet

Test of motor by checking the resistance in all 3 windings

Motor sizes	Ohm
90TYD-S214-M	40Ω
120TYD-S214-M	18Ω

Setting of constant speed:


- Set fourth DIP switch lever in position – ON
-

Test:


- Set fourth DIP switch lever in position – ON
- Press the test button

7.1.3 Copy of the label with information about connection of cables

This self-adhesive label is always placed on the cover of the cabinet. The text is always in English.


**Manuel
Setpoint**

9	10	11	12	13	Black	Blue	Brown												
Relay COM	Relay NC	Relay NO	Uin 0-10VDC	GND	Rotary Guard	GND	VCC (max 10mA)	RS485 A	RS485 B	GND									


Test/Reset

DIP SETTINGS:

DIP1	DIP2	DIP3	DIP4	FUNCTION
OFF	OFF	OFF	---	90 TYD-S214-M 250RPM
ON	OFF	OFF	---	90 TYD-S214-M 275RPM
OFF	ON	OFF	---	120 TYD-S214-M 250RPM
ON	ON	OFF	---	120 TYD-S214-M 300RPM
OFF	OFF	ON	---	120 TYD-S214-L 270RPM
ON	OFF	ON	---	120 TYD-S214-L 300RPM
OFF	ON	ON	---	120 TYD-S214-L 350RPM
---	---	---	OFF	AI 0-10V CONTROL
---	---	---	ON	POTENTIOMETER CONTROL

*Disable Rotary guard
by connecting
14 and 16.*

7.2 Installation of motor that turns rotor and sensor for rotation

Fig.1

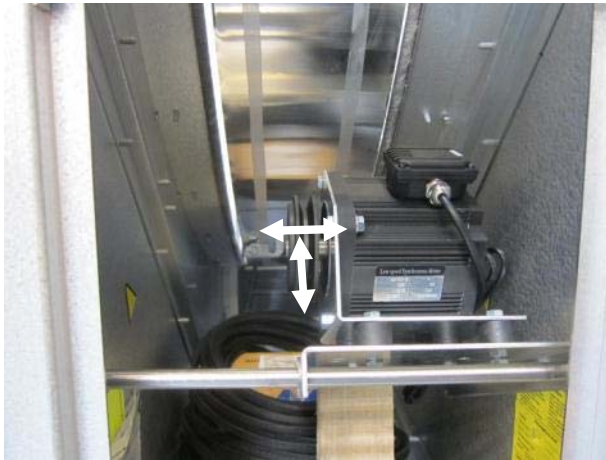


Fig. 1

The motor is installed by delivery

Fig.2

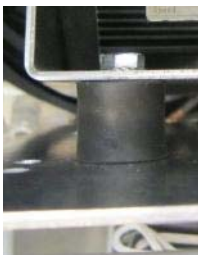


Fig.3



Fig.4



Fig. 2, 3 and 4

The motor is mounted on a console.

Between motor and console is mounted 4 shock absorbers with M8 bolts.

Fig.5



Fig. 1 and 5

The motor must be placed so that the belt positions itself in the middle of the rotor

Fig.6

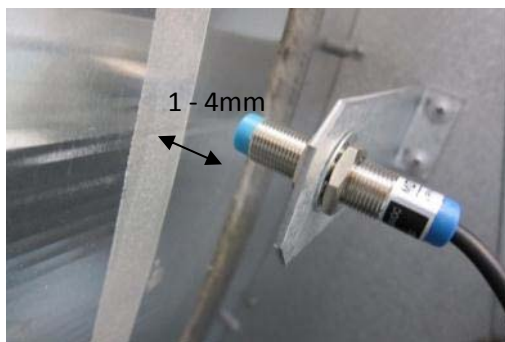


Fig. 6

The sensor for control of rotation, must be placed 1-4 mm from the rotor.

Annex 8. Reversible heat pump for cooling and heating

8.1 DVU-HP section (reversible heat pump unit)

The air handling unit section – DVU-HP – is a separate section in the air handling unit, containing a complete stand-alone reversible heat pump system (heating and cooling). The system has been tested and optimized before delivery. The refrigerant is evaporated and condensed directly in the integrated batteries and the capacity is controlled automatically and steplessly between 5 and 100 %.

The system is delivered with the refrigerant R-410a in the circuit. In the section an internal controller - pCOOEM - and a complete system control all safety functions as well as the capacity of the digital scroll compressor (digital compressor and additional on/off compressor in the larger units DV 20 – DV 80). The system creates exactly the capacity requested by the main air handling unit controller via a 0-10V DC control signal. When a demand for heating or cooling occurs, the main air handling unit controller sends a start signal for heating or a start signal for cooling as well as a capacity signal 0-10V DC to the internal controller in this section. When the signal exceeds 1.6 V DC, the digital compressor starts. After start-up the capacity is regulated between 5 and 50 % by the digital scroll compressor - C1 and Q6 - in the illustration below. When more than 50 % of the capacity is demanded, the control signal exceeds 5.0 V DC and the second compressor, C2 starts. Then the capacity of the digital compressor is reduced to the minimum and with increasing demand gradually increased to 100% capacity. The reverse sequences are activated by declining demand until the demand is less than 5 %. If the control signal is below 0.5V DC, the system will stop.

A full envelope control system in the internal control system prevents operation that exceeds safe conditions for any of the components. Signals from the high and low pressure transmitters, K3 and K4, contribute with information to ensure maximum performance without exceeding the set value and thereby prevent safety switches for the HP and LP, K1 and K2 from disconnecting cooling or heating. This system ensures maximum performance under the given flows and temperatures of supply air and exhaust air.

The system includes 2 electronic expansion valves. One for heating mode - Q3, and one for cooling mode - Q2. Super heat is controlled by the build-in controller and is based on signal showing the evaporating pressure measured by LP transmitter and temperature sensor placed in the common suction line at the compressor console. This ensures a very accurate and efficient performance of the system under all operating conditions.

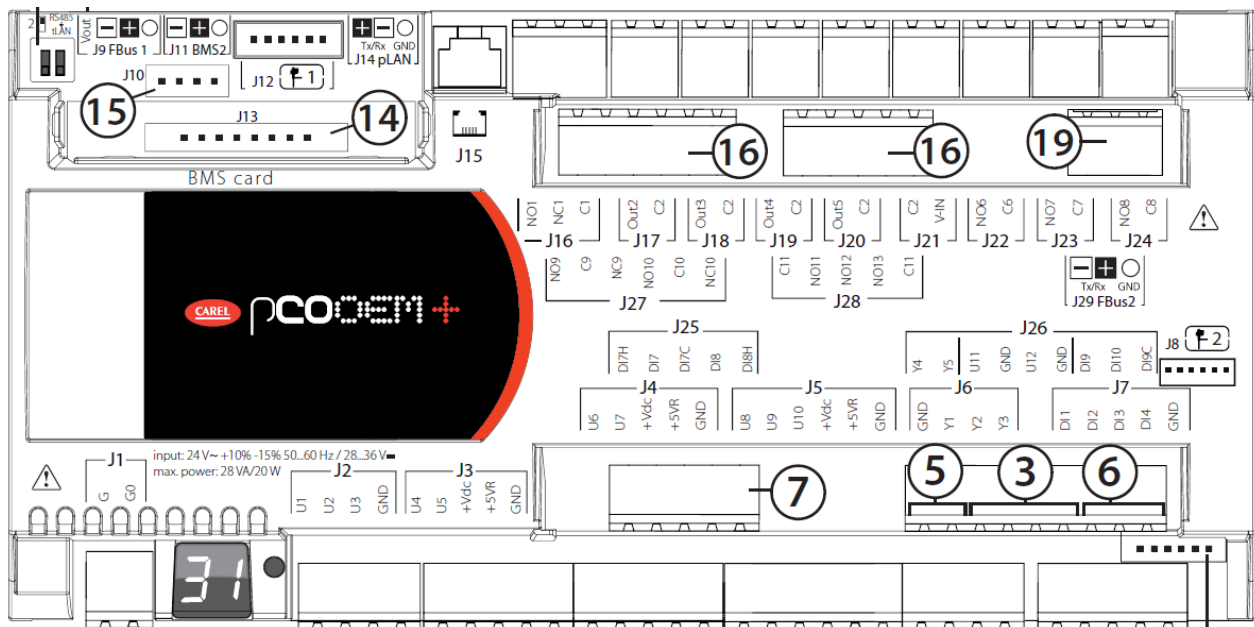
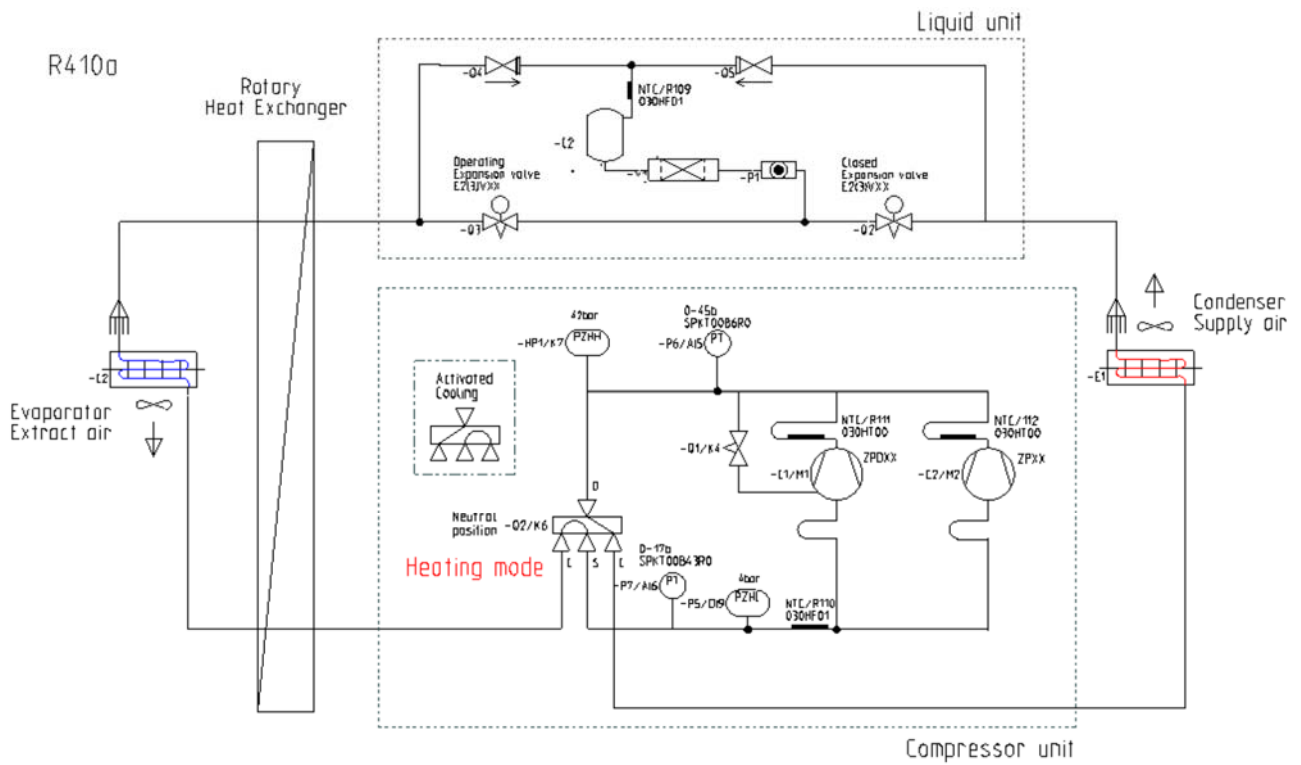
A 4-way valve Q1 changes the function of the system between heating and cooling mode.

The evaporator (condenser in cooling mode) on the DVU-HP unit is placed in the extract air flow after the rotary heat exchanger. This makes it possible to utilize the heat exchanger in both heating and cooling mode for recovery of energy. This will minimize the power consumption of the compressor system.

A heating element has been installed below the evaporator in the drip tray to prevent ice buildup during heating operation.

During heating operation, it is necessary to deice the evaporator in the exhaust air when operating at low outdoor temperatures. In the integrated control system, there is an advanced software function to detect the ice build-up. When ice build-up is at a certain level, a deicing cycle is initiated. During this cycle, the refrigeration system will reverse to bring energy to the coil in the exhaust air, to melt the ice. Once the control system detects that ice is gone, the system returns to normal heating operation. A very quick and efficient cycle.

8.1.1 DVU-HP – Heat pump circuit



8.1.3 Control signals







Signal:	Terminals:	Electrical:
Start (Heat mode)	X5; 18-19	Potential free contact
Cooling demand	X5; 16-17	Potential free contact
Capacity	X5; 10-11	10: gnd. 11: 0-10V _{DC}
Alarm	X5; 25-26	Potential free contact

8.2 DVU-HP-internal controller for the compressor system

Control panel pGD1 placed inside the integrated control cabinet



The control panel has 6 buttons with the following functions

 - <i>Alarm</i>	Display the list of active alarms Manually reset alarms
 - <i>Prg</i>	Access the service menu
 - <i>Esc</i>	Return to the previous screen
 - <i>Up</i>	Navigate between the display screens or increase/decrease values
 - <i>Down</i>	
 - <i>Enter</i>	Switch from parameter display to edit Confirm value and return to the parameter list

By flashing red alarm light, there is an active alarm and display is not in alarm view.

By permanent red alarm light, there is an active alarm and display is in alarm view

8.3 Background illumination of the display

Background illumination of the display switches on automatically when the first push button is activated.

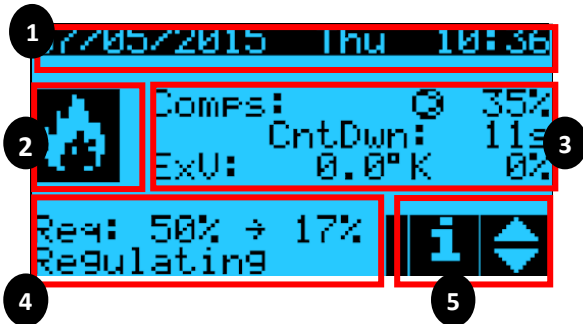
The illumination switches off some time after the last activation. By alarm the red alarm button flashes until the alarm is acknowledged.

8.4 Menu – drawing of the menu structure to guide the user





Overview of the menus appears from annex 9.

8.5 The start display, Main menu

The following screen displays an example of the main screen with an active unit, highlighting the fields and icons used:



1. Date and Time
2. Current unit status:

	Unit OFF
	Summer mode (cooling)
	Winter mode (heating)
	Defrosting in progress

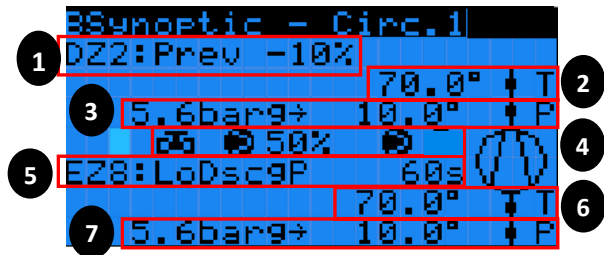
3. Devices status
 - a. Compressors in operation and digital capacity. Digital 35% output, fixed off)
 - b. Timer in action, Min on/off time, Min time between starts
 - c. Super Heat and Expansion valve opening
4. System capacity request and actual power output
 - a. System status
 - i. System OFF
 - ii. ON by input, but no capacity signal
 - iii. Regulating
 - iv. Pump-Down, and count down
 - v. Defrosting, and count up
 - vi. Manual mode
 - vii. OFF alarm
5. Indicates access to the info menu using the DOWN button

8.6 Settings

From the main screen, the DOWN (UP) button can be used to scroll through the status of devices. No password is needed to access these variables.

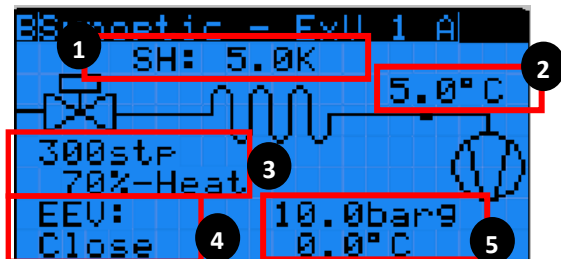
The physical status of inputs, outputs and transmitters are all available in the menus. The individual screens are shown below.

Compressor status:



1. Discharge temperature zone and prevent action.
2. Discharge temperature
3. Condensing pressure and temperature
4. Compressors status and digital percentage;
5. Envelope zone and time:
 - EZ1:Ok: zone within operating limits
 - EZ2:HiDP: High compression ratio
 - EZ3:HiDscgP: High condensation pressure
 - EZ4:HiCurr: High motor current
 - EZ5:HiSuctP: High suction pressure
 - EZ6:LoDP: Low differential pressure
 - EZ7:LoPRat: Low compression ratio
 - EZ8:LoDscgP: Low condensation pressure
 - EZ9:LoSuctP: Low evaporation pressure
6. Suction gas temperature
7. Evaporating pressure and temperature

Expansion Valve Overview:



1. Super Heat and actual set-point
2. Suction gas temperature
3. Valve opening mode, percentage and steps;
4. Valve status:
 - Close: valve closed
 - Std-by: system stop position
 - Pos: fixed position during sequence
 - Wait: after positioning and in case of change of cooling capacity greater than 10%, the valve to do large movement that can take some seconds. Wait will be displayed during this phase.
 - On: valve in regulation
 - Init: driver initialization

Evaporating pressure and temperature

Status Information:

Info	Info - Input
Press ENTER to check advanced devices info	Defrost
→ I/O status	Evap.temp.: 0.0°C
→ Working hours	Filtered: 0.0°C
→ Devices in manual	CntDown: 2990
→ System info	Defrost status: 0
	Check start 5s

Push Enter to get the following information:

Info - Output	Info - Input	Info - Output
Comp.1-Digital scroll	Suction pressure	Compressor 2
N011 On	U6: 0.0bar	N012 Off
N02 Digital valve Off	Evap.temp.: 0.0°C	
Power: 100.0%	Suction temperature	
Hours: 0000/030000h	U2: 0.0°C	Hours: 0000/030000h

Info - Output	Info - Input	Info - Output
N03-Oil valve: Off	Discharge pressure	Y1-Envelope: 0.0%
N04-4way valve: Heat	U5: 27.0bar	Y2-Comp.fbk: 100.0%
N05-Drip tray: On	Cond.temp.: 45.8°C	Y3-ExU perc.: 0%
N06-ExU alarm: Off	Discharge temperature	
N07-General alarm: Off	U4: 15.7°C	
N09-Defrost: Off	Subcool.temp.: 5.7°C	
N010-Discharge al.: Off	Subcooling: 0.0°C	

Info - Input	Info - Input	Information
Discharge temperature	Capacity reference	NOSTDmCOMM
U11 Comp.2: 0.0°C	U7 50.2%	Version: 2.1.009
U12 Comp.3: 0.0°C		Date: 06/05/15
Optional Probes		Bios: 6.27 09/07/04
U8: 0.0°C		Boot: 5.00 09/07/04
U9: 0.0°C		
U10: 0.0°C		

Info - Input	Information	Info - Dig.In
ID1-Alarm reset: Off	Board type:	ID7-Comp.alarm: Ok
ID2-Cooling: Cool	Board size:	ID8-Phase alarm: Ok
ID3-Defrost: Ok	Total flash: 2048KB	ID9-Low press.: Ok
ID4-Remote ON: On	RAM: 1024KB	ID10-High Press.: Ok
	Built-In type:	
	Main cycle: 4.8cycle/s	
		208ms

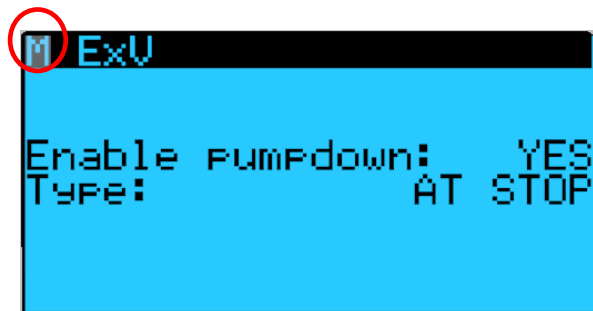
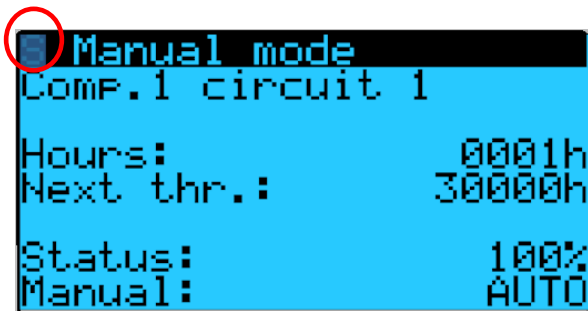
8.7 Service

Regardless of the displayed screen, pressing the programming key accesses the password entry screen which allows access to the menu shown below for service level. Enter the password (1111) and push enter. Once the password is entered, it will be maintained for 5 minutes from the last time a key was activated. Then the password will have to be re-entered in order to access the service level again. In the Log-Out menu, you can log-out without waiting 5 minutes.

Service level gives read access to all parameters with the ability to edit some of them. For more information on the parameters that can be changed, see the parameter table. Default password: 1111.



As soon as the password is entered in the log in screen, and function selected, the access level needed to edit the values is shown. As shown in the following screens, S flashing for Service and M for Manufacturer:



8.8 Manual operation

From the menu – Manual mode – it is possible to operate components manually. The technician can control the operation of components manually. This procedure is relevant for the test during the annual maintenance with the control of all safety and control functions or after exchange of components. Menus as follows:

In the first screen above: Compressor 1 status. Actual operating hours. Next threshold of operating hours for service can be set. Current capacity and selection of manual mode.

```

Manual mode
Comp.2 circuit 1
Hours:           0000h
Next thr.:       30000h
Status:          Off
Manual:          AUTO
  
```

Compressor 2 status. Actual operating hours. Next threshold of operating hours for service can be set. Current status and manual selection.

When operating compressors manually, Super Heat control will still be active as long as set to Auto.

```

B Manual mode
ExV circ.1 heating
Enable manual
valve position:   B
Manual valve
Position:         IIIIstep
  
```

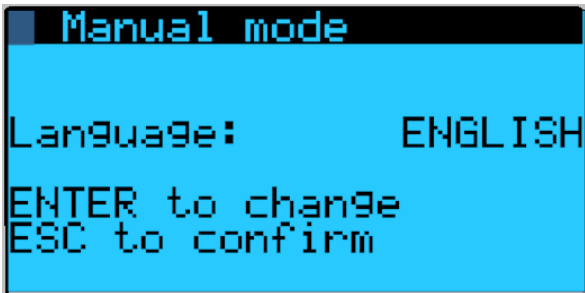
Preliminary

Expansion valves can be operated manual individually. The valve do have 0-480 steps

```

S Manual mode
Day:              7
Month:            5
Year:             15
                  Thursday
Hour:             12
Minute:           22
  
```

Date and time



Only English is available

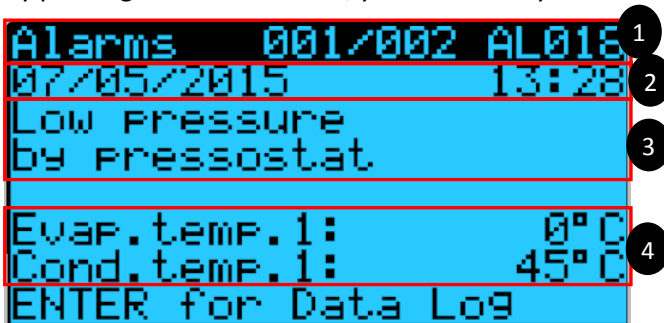
8.8.1 Running hours

This is available in the menu for maintenance.

8.9 Alarm

8.9.1 Alarm

By pushing the Alarm button, you can see any active alarm.



1. Alarm 1 of 2 active alarms which has not been reset. Alarm number from list below
2. Time and date of alarm
3. Alarm type
4. Operating conditions at the point of alarm

8.9.2 Alarm Log

By using the enter key you can enter the alarm log. Up to 100 alarms are saved.

8.9.3 Alarm reset

Alarms can be reset manually, automatically or with retries.

- Manual reset: When the alarm condition is no longer present, you must enter alarm menu and acknowledge the alarm by pushing the alarm button. Now the unit can restart.
- Automatic reset: When the alarm condition is gone, the system will automatically restart. Still holding min off time.
- Automatic reset with retries: Retry conditions are checked, if OK, it will be automatic reset mode. If not, it will be manual reset mode.

8.9.4 Alarm list

Code	Description	Reset	Action	Delay
AL001	Probe U1 broken or disconnected	A	None	10s
AL002	Probe U2 broken or disconnected	A	Circuit OFF	No
AL003	Probe U4 broken or disconnected	A	Circuit OFF	10s
AL004	Probe U5 broken or disconnected	A	Circuit OFF	No
AL005	Probe U6 broken or disconnected	A	Circuit OFF	10s
AL006	Probe U7 broken or disconnected	A	None	No
AL007	Probe U8 broken or disconnected	A	None	10s
AL008	Probe U9 broken or disconnected	A	None	10s
AL009	Probe U10 broken or disconnected	A	None	10s
AL010	Probe U11 broken or disconnected	A	Compressor 2 OFF	10s
AL011	Probe U12 broken or disconnected	A	Compressor 3 OFF	10s
AL012	Low SH alarm	M	Circuit OFF	180s
AL013	LOP alarm	A	Circuit OFF	180s
AL014	MOP alarm	A	Circuit OFF	180s
AL015	Low suction temp.	A	Circuit OFF	180s
AL016	High discharge press.	M	Circuit OFF	3 retries
AL017	Low suction pressure	A	Circuit OFF	3 retries
AL018	Low pressure by pressostat	A	Circuit OFF	3s
AL019	Envelope alarm	A	Circuit OFF	300s
AL020	Motor phase alarm	A	Circuit OFF	No
AL021	High pressure by pressostat	M	Circuit OFF	3 retries
AL022	High discharge temp. compressor 1	A	Circuit OFF	60s
AL023	High discharge temp. compressor 2	A	Compressor 2 OFF	No
AL024	High discharge temp. compressor 3	A	Compressor 3 OFF	No
AL025	Pump-down end for max time circuit 1	A	None	No
AL026	Maintenance request compressor 1	A	None	Parameter
AL027	Maintenance request compressor 2	A	None	Parameter
AL028	Maintenance request compressor 3	A	None	Parameter
AL029	Clock alarm	A	None	No
AL030	Memory expansion damaged	A	None	No
AL031	BMS Offline	A	50%	60s

8.10 Maintenance

General maintenance must be carried out according to national and local regulations by a skilled technician from a certified company.

List of spare parts as well as datasheets from the manufacturers are available on the DVD delivered with the unit.

8.11 DVU-HP- Data

Dimensions, heating and cooling capacity, refrigerant content

DVU-HP	10	15	20	25	30	40	50	60	80
Width in mm	970	1120	1270	1420	1570	1720	2020	2170	2170
Height in mm	970	1120	1270	1420	1570	1720	2020	2240	2540
Length in mm	1420	1420	1420	1420	1570	1570	2320	2460	2460
Weight in kg	190	240	280	375	400	550	700	1000	1200
Power supply – 3 phase + N + PE 3x400V + N + PE									
Pre fuse Amp.	10A	16A	20A	25A	32A	40A	50A	63A	63A
Refrigerant	R410a	R410a	R410a	R410a	R410a	R410a	R410a	R410a	R410a
Refrigerant content in kg	3	4	6	8	10	12	24	26	28
Test pressure, 46,2 bar									
Nominal air volume, m3/s	1.0	1.4	1.9	2.4	2.9	3.6	5.0	5.9	6.7
Cooling capacity, kW	14	18	27	32	37	47	64	78	80

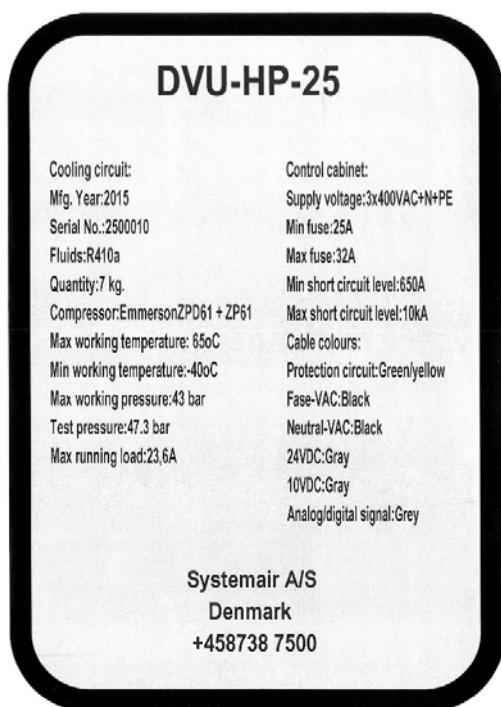
Values based on 50°C condensing temperature and 10° evaporating temperature

Detailed performance data can be found by using design program SystemairCAD

8.12 Data plate

The data plate for the cooling unit is mounted inside the unit section – DVU-HP – behind one of the doors.
An example of the data plate is shown below.

Inside the unit



Outside on the unit



Control cabinet:

Supply voltage: 3x400VAC+N+PE

Min fuse: 63A

Max fuse: 80A

Min short circuit level: 650A

Max short circuit level: 10kA

Cable colors:

Protection circuit: Green/yellow

Phase-VAC: Black

Neutral-VAC: Blue

24VDC: White

0VDC: White

Analog/digital signal: Grey

Annex 10. Connection of fan motor

10.1 Power for fan motors

The power supply for the units is 3*400 V + N + PE - 50 Hz. Protection of the units in accordance with the local statutory requirements for the additional protection of systems with frequency converters must be delivered and installed on site by the installer.

Information about fuses is available in annex 2.

Annex 11. Commissioning

See separate cover with annexes 1, 2, 3, 11, 12 and 15

Annex 12. Test report

See separate cover with annexes 1, 2, 3, 11, 12 and 15

Annex 13. Short description of main components in control system

13.1 Components for the control system in TIME

The air handling unit is built with a complete and fully integrated control system based on the Systemair E28 controller installed in the cabinet that is placed in the section with the supply air fan. The unit is tested at the factory and all functions are confirmed by a final functional test and test report. The control system is configured according to the customer's order to promote easy start-up on the site. The test report is annex 12.

13.1.1 Delivered in several sections

After the final test the unit is divided in sections to facilitate the transport. After reassembly of the unit on the site, and cables are pulled through the prepared routings, the cables must be reconnected in the marked cabinet terminals. All external components must be connected on the site.

13.1.2 Delivered assembled on base frame

Units assembled on base frame shall only be connected to supply cables and cables for all external components on the site. All internal cables are connected from the factory.

13.1.3 External components

External components are Systemair Control Panel, valves, valve motors, pressure transmitters, supply air temperature sensor, temperature sensor for frost protection of the heating coil (if water heating coil is delivered) and circulation pump (Systemair does not deliver the pump). No external components are connected to the cabinet, when the unit is delivered. Terminals are present in the cabinet for pressure transmitters, if it is a solution for constant pressure in the ducts, and terminals are present in the cabinet for valve motors, circulation pump, supply air temperature sensor and temperature sensor for frost protection of the heating coil (if water heating coil is delivered) but cables are not installed and not connected to terminals in the cabinet. The Systemair Control Panel with 10 meters of cable is not connected to the controller in the cabinet. External components are packed in a cardboard box delivered together with the unit. Cable for the power supply and all cables from the external components must be lead into the unit through a cable entry in the bottom of the supply fan section. It is very important that the cable entry is properly sealed by the installer to avoid any entry of "false" air.

Annex 14. Wiring diagram

See below

TIMEec Control system

Documents listed on below pages

General description 1 - 9

Document list 10 - 14

Circuit diagram 15 - 34

Switchboard layout 35 - 39

Graphical list

Product list 40 - 44

PLC I/O list 45 - 49

Wires list 50 - 59

Terminal matrix 60 - 69

Cable plan 70 - 99

Cabinet is placed behind cabinet door for the supply air fan

Data over AHU unit.

Heat exchanger type:

See data in the attached annex - Technical data

Heat coil type:

See data in the attached annex - Technical data

Cooling coil type:

See data in the attached annex - Technical data

Heat pump type:

See data in the attached annex - Technical data

Electrical data:

Total consumed power:

Fan fuse size:

Supply air fan cable resistance:

Extract air fan cable resistance:

Max pre-fuse:

Ik max on fuse in unit:

Watch printed order


10 kAmps

Manufacture:

Systemair A/S, Denmark
Ved Milepælen 7
8361 Hasselager

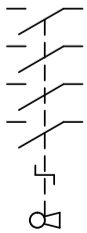
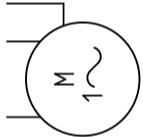


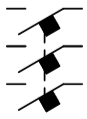





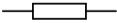

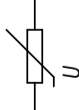

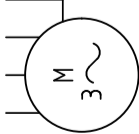


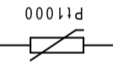



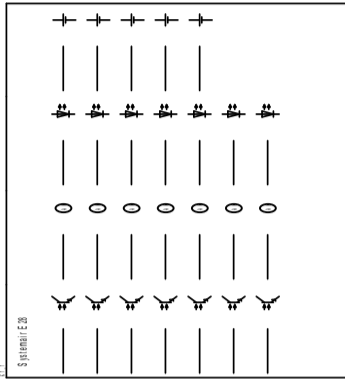

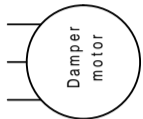
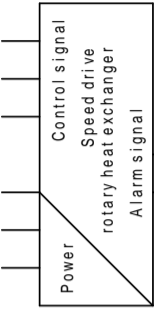
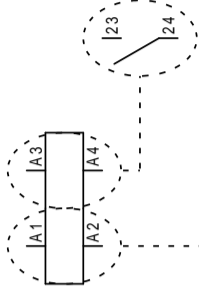


supplier:

Systemair A/S, -----

 systemair	TIME EC Corrigo 3.4	Frontpage	Project: TIMEec Control system Gen-3		Drawing no.:	Init.:	Rev Date.:	Rev.:	Sheet:
			Date: 30-04-2012	Function: =A3	Cabinet:	KAJU	06-05-2015	03.03	1
Total sheets:								3	Next sheet: =A3/3

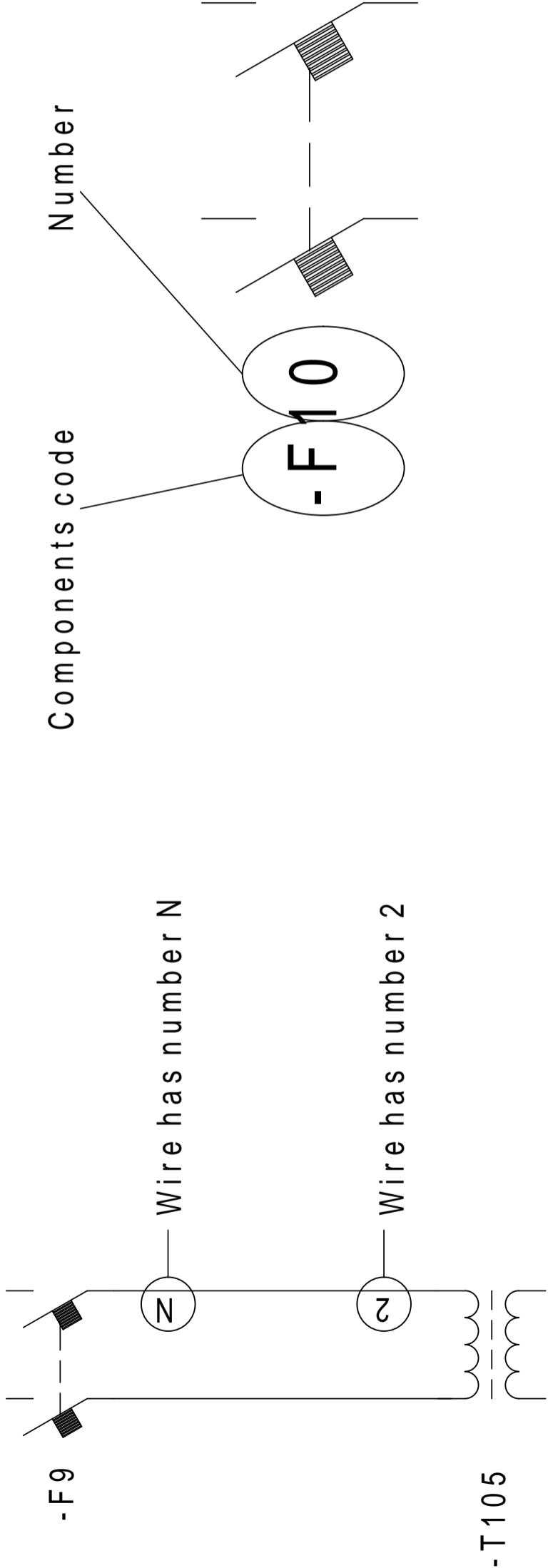
Symbols are according to IEC 60617.


On this page are descriptions of used symbols in the project.


	Switchgear, 4 pole		Cirkulation pump
	Cable		Lamp
	Automatic tripping, 3-pole		Info text
	Automatic tripping, 2-pole		Fuse
	Shielded cable		Transformer
	Resistor		Switchgear
	Thermistor		Switchgear
	Motor three phase + PE		7 ø fireguard
	References		Temperature (measuring)
	Terminal		Pressure
	Relay contacts, NC		Corrigo E28
	Switchgear		Damper motor
			Rotary heat exchanger
			Relay coil with 2 coils
			Relay contact 2
			Relay contact 1

Labeling of wires
Cables are marked with
terminal name

Components are marked with component codes
followed by a number according to IEC 61346-1 Chart 1

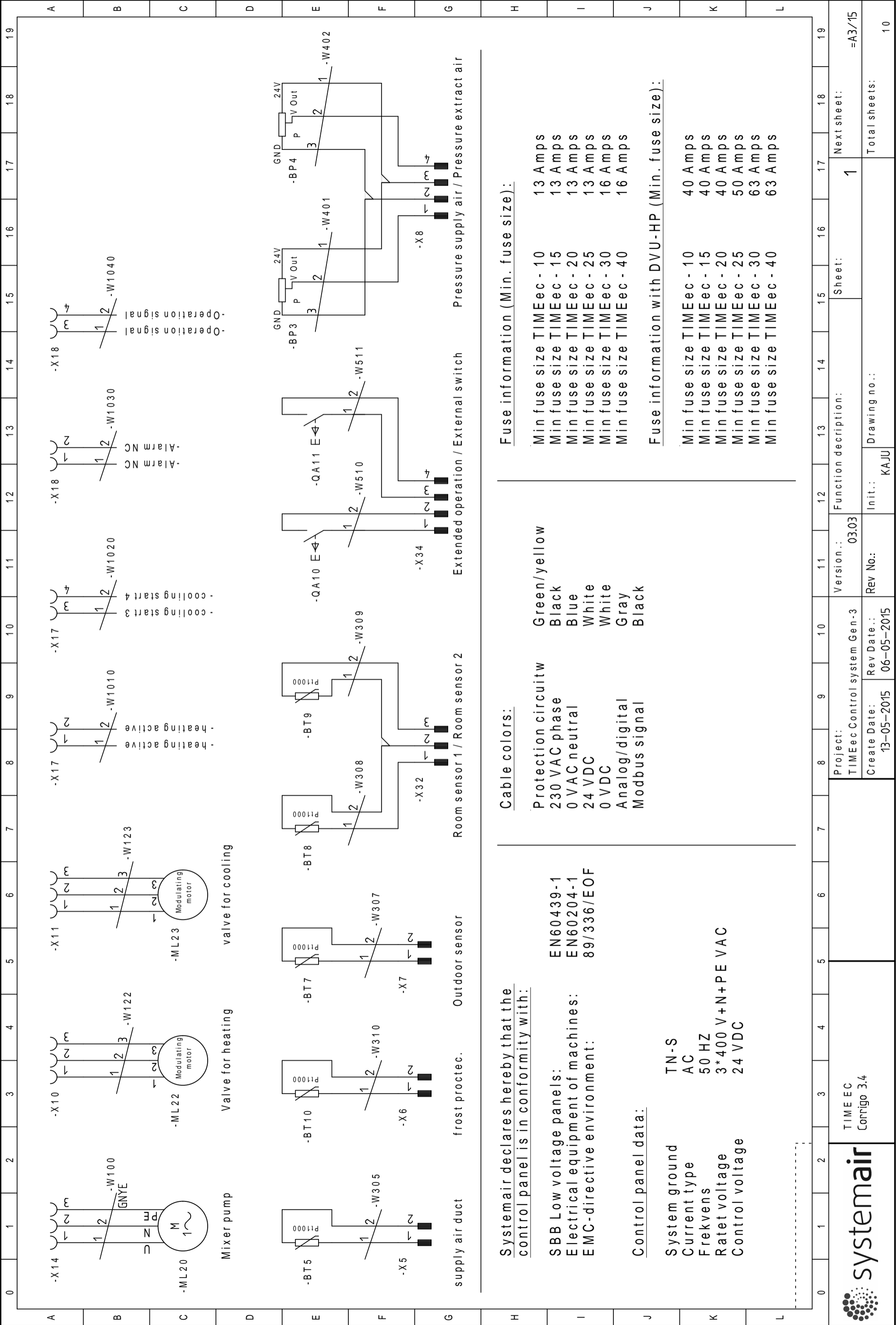


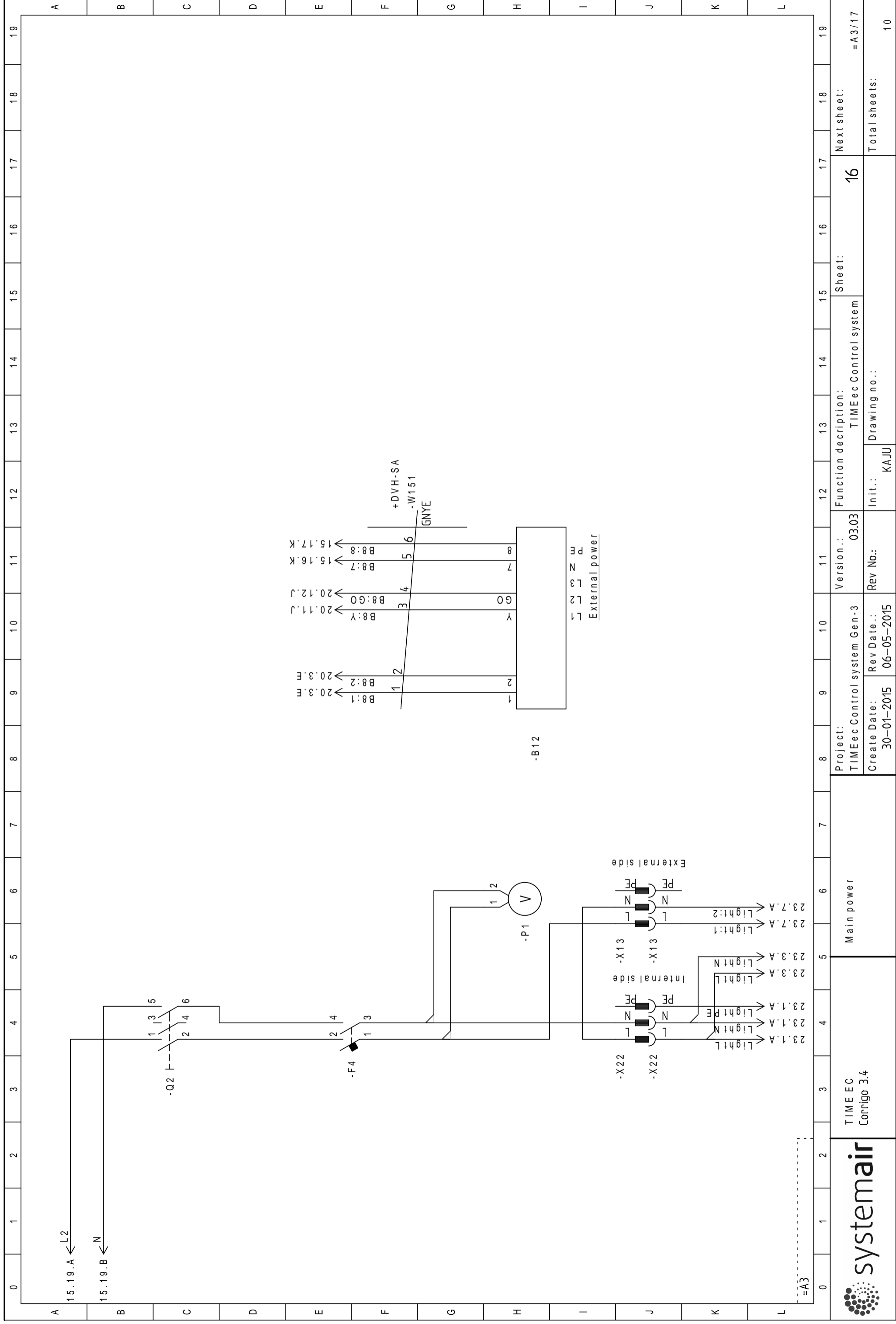
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			Date: 30-04-2012	Function: =A3		Total sheets: 3		Next sheet:

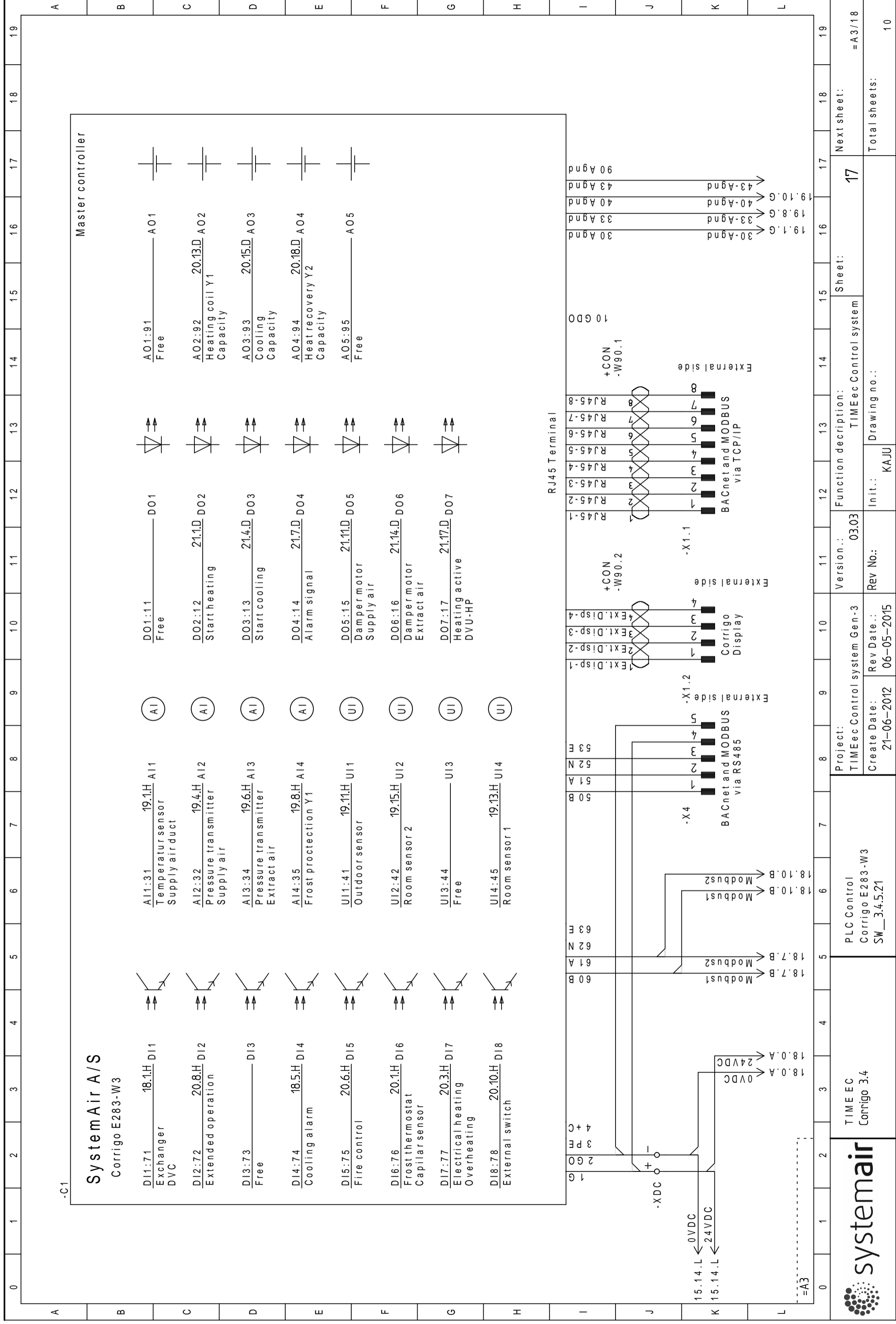
List of Documents									
Function (=)	Location (+)	Sheet	Kind of Document	Description	Function description:			Revision date	
		1	Document list		Init.: KAJU			19-06-2015	
		2	Document list		Drawing no.:			19-06-2015	
=A3		1	Project cover sheet	Frontpage				19-06-2015	
=A3		3	Project cover sheet	General Description Symbols				19-06-2015	
=A3		4	Project cover sheet	General Description Wires				19-06-2015	
		1	Circuit Diagram IEC					19-06-2015	
=A3		15	Circuit Diagram IEC	Main power				19-06-2015	
=A3		16	Circuit Diagram IEC	Main power				19-06-2015	
=A3		17	Circuit Diagram IEC	PLC Control				19-06-2015	
=A3		18	Circuit Diagram IEC	Digital input				19-06-2015	
=A3		19	Circuit Diagram IEC	Analog input				19-06-2015	
=A3		20	Circuit Diagram IEC	Universal input				19-06-2015	
=A3		21	Circuit Diagram IEC	Digital output				19-06-2015	
=A3		22	Circuit Diagram IEC	Digital output				19-06-2015	
=A3		23	Circuit Diagram IEC	Output				19-06-2015	
=A3		35	Cabinets					19-06-2015	
		40	Product list					19-06-2015	
		41	Product list					19-06-2015	
		1	PLC I/O list					19-06-2015	
		1	Wires list					19-06-2015	
		2	Wires list					19-06-2015	
		3	Wires list					19-06-2015	
		4	Wires list					19-06-2015	
		5	Wires list					19-06-2015	
		6	Wires list					19-06-2015	
		7	Wires list					19-06-2015	
=A3		60	Terminal Matrix	-X0				19-06-2015	
=A3		61	Terminal Matrix	-XDC				19-06-2015	
		70	Cable plan					19-06-2015	
		71	Cable plan					19-06-2015	
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				Init.: KAJU		Drawing no.:		Total sheets: 2	
				Date: 19-06-2015		Rev.:			

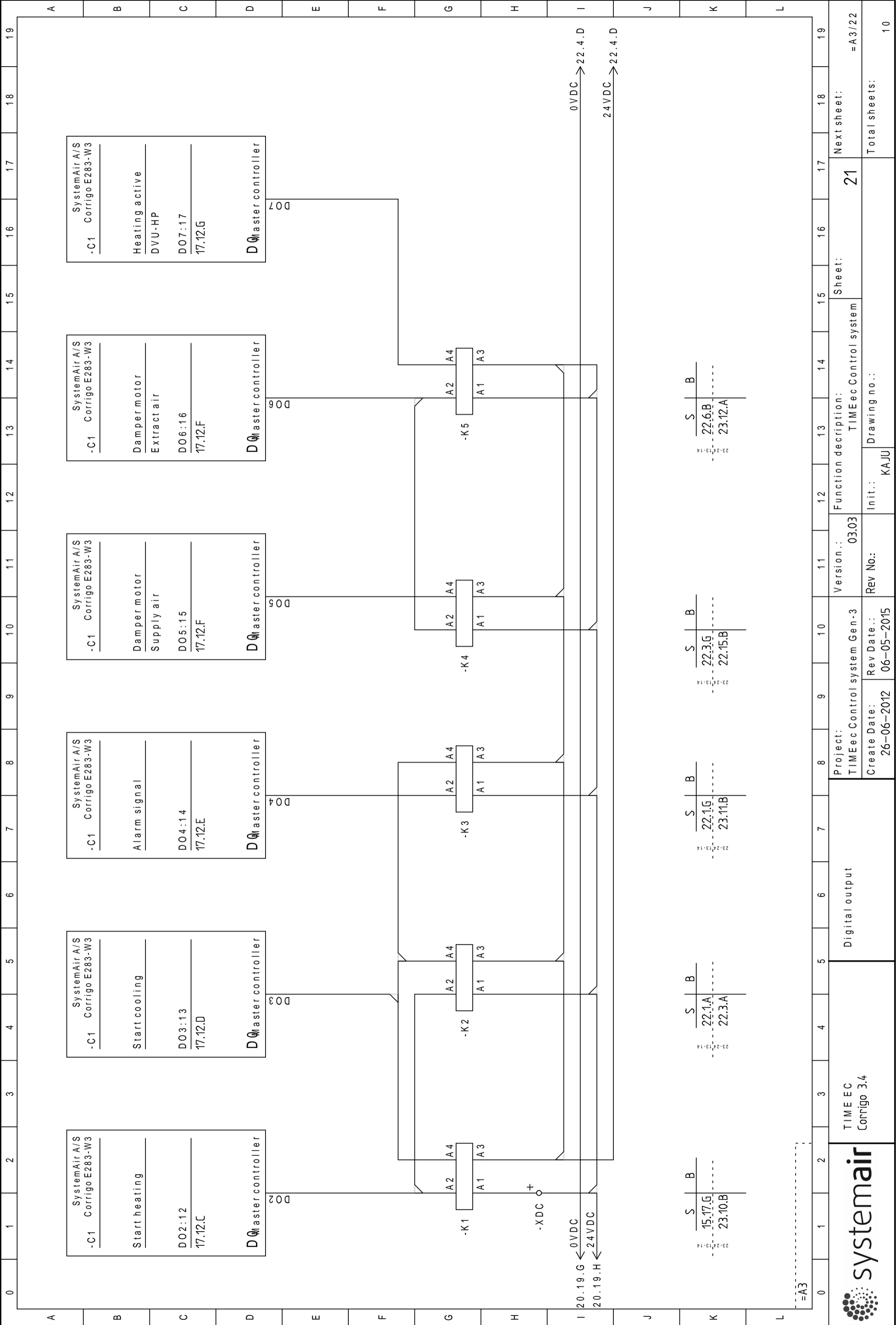
List of Documents

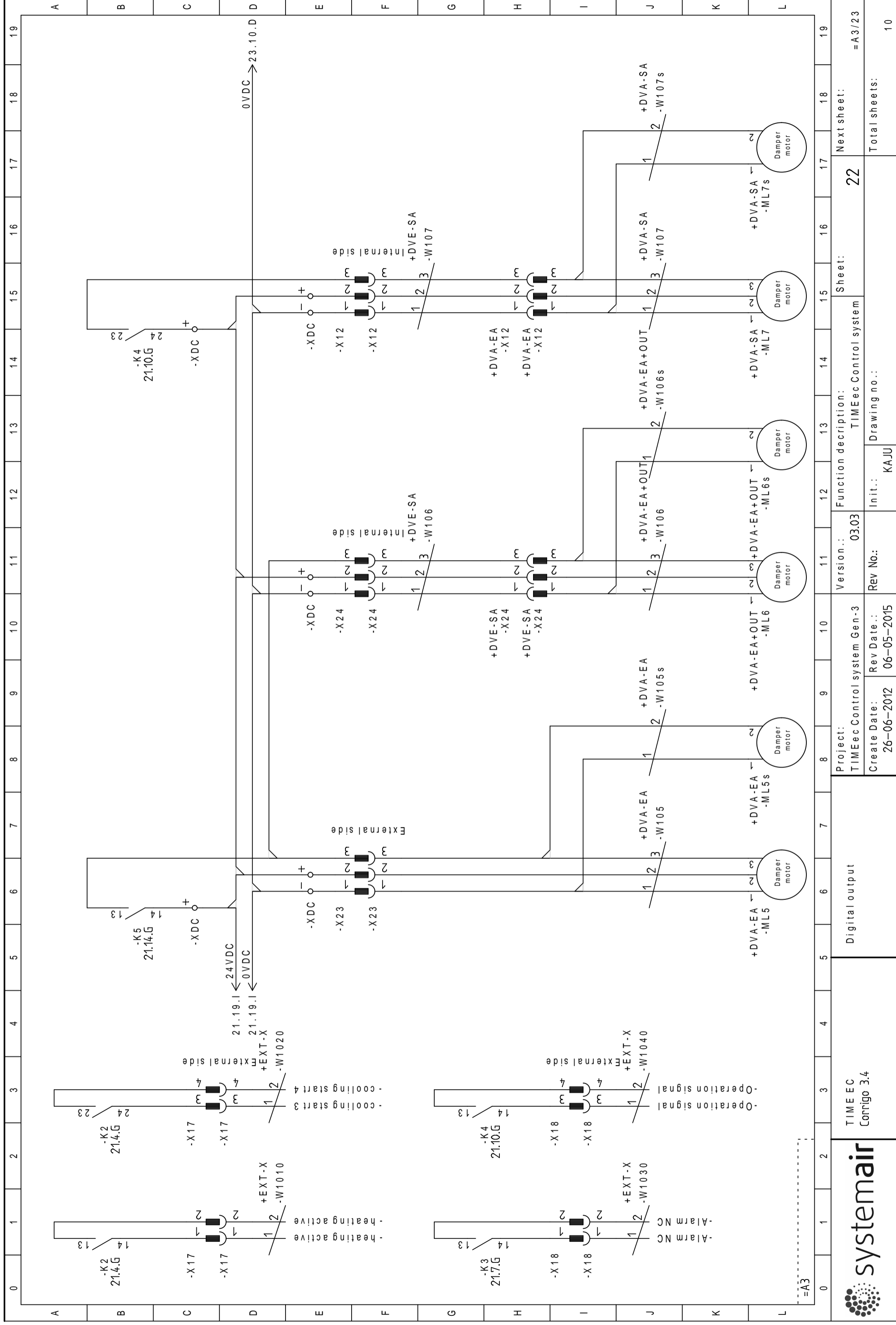
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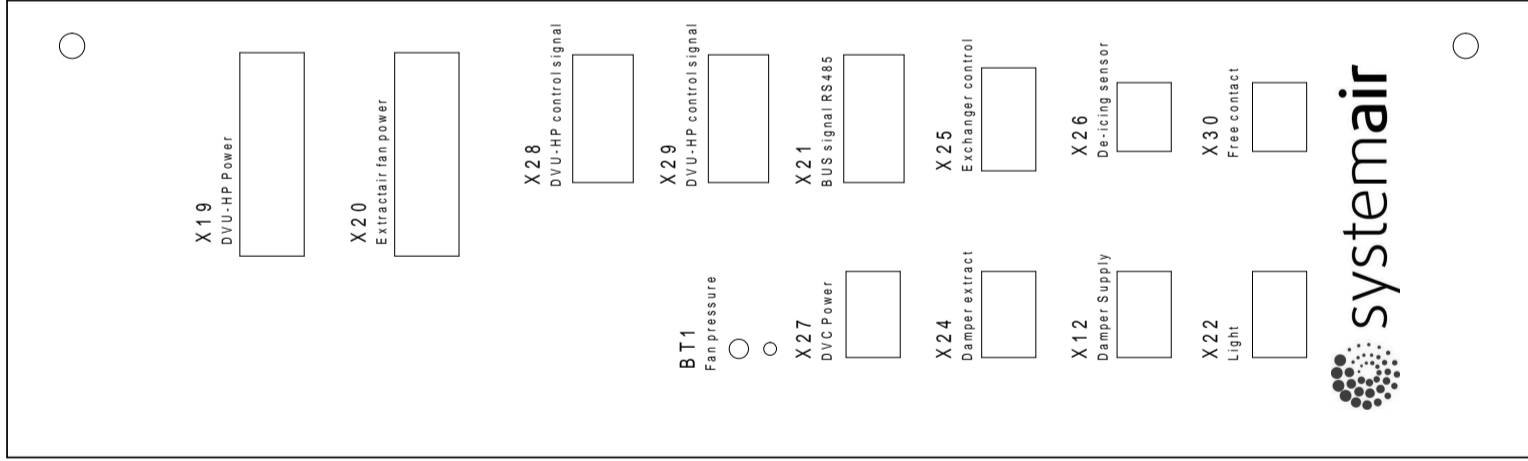
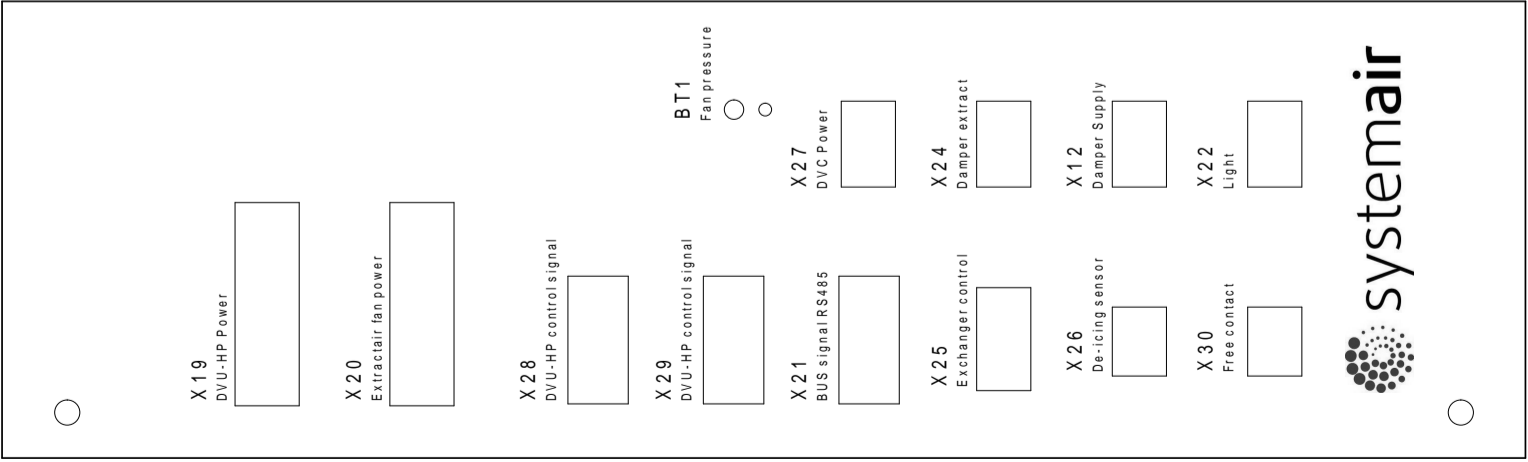




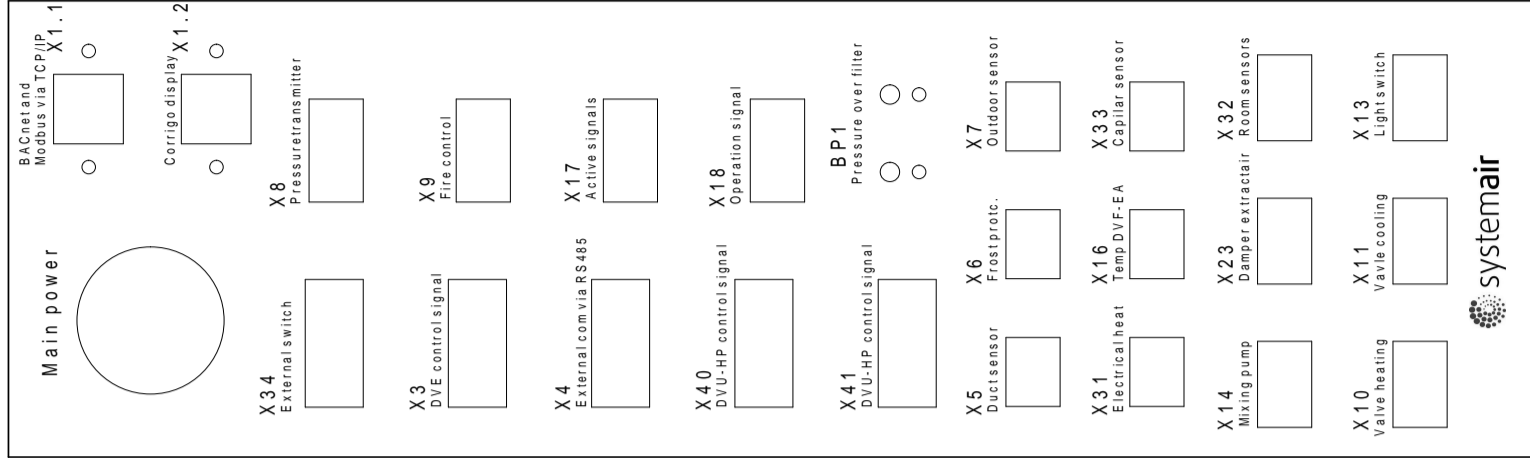
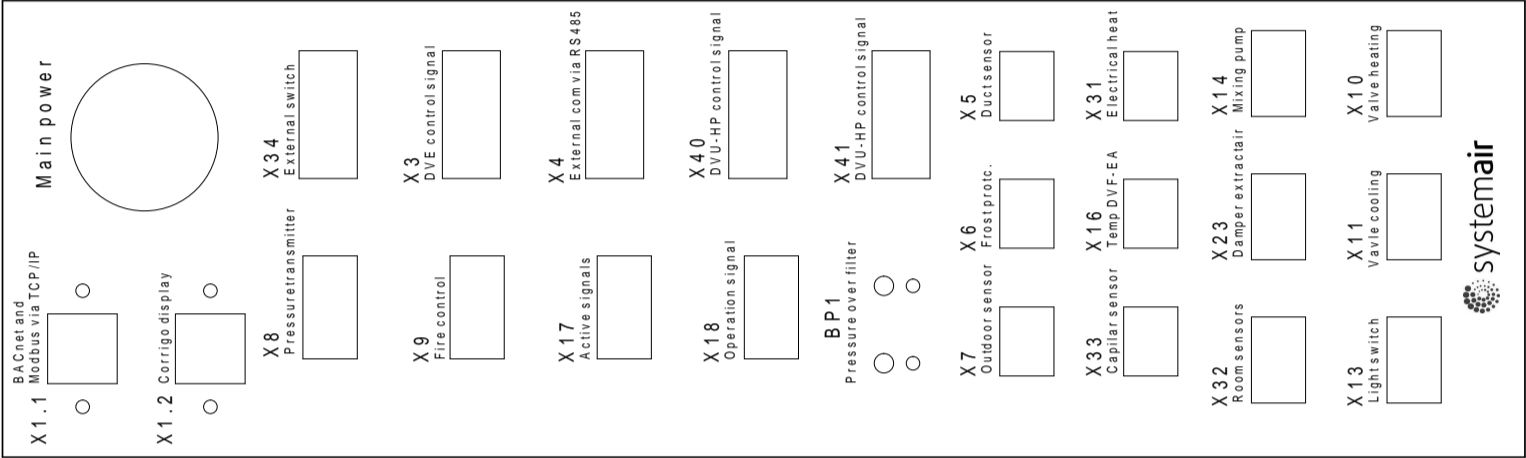





Cabinet side, internal



Cabinet side, external




List of Products						
Product (-)	Type	Manufacture		Document type	Sheet	Path
-Q1				Circuit Diagram IEC	15	3.B
-F1				Circuit Diagram IEC	15	3.D
-F3				Circuit Diagram IEC	15	14.D
-F2				Circuit Diagram IEC	15	3.E
-T1				Circuit Diagram IEC	15	14.F
-ML20				Circuit Diagram IEC	15	17.K
-Q2				Circuit Diagram IEC	16	4.B
-F4				Circuit Diagram IEC	16	4.E
-P1				Circuit Diagram IEC	16	6.G
-B12				Circuit Diagram IEC	16	9.H
-C1				Circuit Diagram IEC	17	2.I
-B11				Circuit Diagram IEC	18	3.C
-ML10				Circuit Diagram IEC	18	1.E
-BP1				Circuit Diagram IEC	18	9.F
-ML1				Circuit Diagram IEC	18	12.F
-BP2				Circuit Diagram IEC	18	15.G
-ML2				Circuit Diagram IEC	18	18.G
-M8				Circuit Diagram IEC	18	3.H
-BT3				Circuit Diagram IEC	18	8.K
-BT4				Circuit Diagram IEC	18	11.K
-BT1				Circuit Diagram IEC	18	14.K
-BT2				Circuit Diagram IEC	18	16.K
-BT5	90812009			Circuit Diagram IEC	19	1.A
-BP3				Circuit Diagram IEC	19	3.A
-BP4				Circuit Diagram IEC	19	5.A
-BT10				Circuit Diagram IEC	19	8.A
-BT7				Circuit Diagram IEC	19	10.A
-BT8				Circuit Diagram IEC	19	13.A
-BT9				Circuit Diagram IEC	19	15.A
-BT11				Circuit Diagram IEC	20	1.A
		TIME EC Corrigo 3.4		Project: TIMEec Control system Gen -3		Init.:
				Drawing no.:		Rev.:
				Date: 19-06-2015		Page: 40

List of Products

[illegible]

List of PLC I/O

Function (=)	Location (+)	PLC (-)	Operand	Symbol Address	Comment	Con. No.	MODBUS	BACKnet	Connection	Sheet	Cell
=A3		-C1	A1:31	Temperatur sensor	Supply air duct	A11			=A3--X5:2	19	1.H
=A3		-C1	A12:32	Pressure transmitter	Supply air	A12			=A3--X8:1	19	4.H
=A3		-C1	A13:34	Pressure transmitter	Extract air	A13			=A3--X8:4	19	6.H
=A3		-C1	A14:35	Frost protection Y1		A14			=A3--X6:2	19	8.H
=A3		-C1	A02:92	Heating coil Y1	Capacity	A02			=A3--X10:3	20	13.D
=A3		-C1	A03:93	Cooling	Capacity	A03			=A3--X29:3	20	15.D
=A3		-C1	A03:93	Cooling	Capacity	A03			=A3--X11:3	20	15.D
=A3		-C1	A04:94	Heat recovery Y2	Capacity	A04			=A3--X25:3	20	18.D
=A3		-C1	D11:71	Exchanger	DVC	D11			=A3--X25:4	18	1.H
=A3		-C1	D12:72	Extended operation		D12			=A3--X34:1	20	8.H
=A3		-C1	D14:74	Cooling alarm		D14			=A3--X28:2	18	5.H
=A3		-C1	D15:75	Fire control		D15			=A3--X9:3	20	6.H
=A3		-C1	D16:76	Frost thermostat	Capillar sensor	D16			=A3--X33:2	20	1.H
=A3		-C1	D17:77	Electrical heating	Overheating	D17			=A3--X31:2	20	3.H
=A3		-C1	D18:78	External switch		D18			=A3--X34:4	20	10.H
=A3		-C1	D02:12	Start heating		D02			=A3--K1:A2	21	1.D
=A3		-C1	D03:13	Start cooling		D03			=A3--K1:A4	21	4.D
=A3		-C1	D04:14	Alarm signal		D04			=A3--K3:A2	21	7.D
=A3		-C1	D05:15	Damper motor	Supply air	D05			=A3--K4:A4	21	11.D
=A3		-C1	D06:16	Damper motor	Extract air	D06			=A3--K5:A2	21	14.D
=A3		-C1	D07:17	Heating active	DVU-HP	D07			=A3--K5:A4	21	17.D
=A3		-C1	UI1:41	Outdoor sensor		UI1			=A3--X7:2	19	11.H
=A3		-C1	UI2:42	Room sensor 2		UI2			=A3--X32:3	19	15.H
=A3		-C1	UI4:45	Room sensor 1		UI4			=A3--X32:1	19	13.H
=A3											
<div><div></div><div>TIME EC Corrigo 3.4</div></div>				Project: TIMEec Control system Gen-3		Function description: TIMEec Control system		Sheet: 1	Next sheet:		
				Date: 19-06-2015	Rev.:	Init.:	KAJU	Drawing no.:		Total sheets: 1	

Wirelist

From		To	Type	Length	No.	Colour	Square
=A3-Q2:1		=A3-X0:L2		195	@	BLACK	6
=A3-X19:PE		=A3-X0:PE			@	GREEN/YELLOW	1.5
=A3-X28:2		=A3-C1:DI4			@	GRAY	0.5
=A3-K1:A2		=A3-C1:D02			@	GRAY	0.5
=A3-X18:2		=A3-K3:I3			@	GRAY	0.5
=A3-X18:1		=A3-K3:I4			@	GRAY	0.5
=A3-F3:2		=A3-F1:1			@	BLACK	4
=A3-Q1:2		=A3-F1:1			@	BLACK	4
=A3-F2:2		=A3-F1:2			@	BLACK	4
=A3-Q1:4		=A3-F1:3			@	BLACK	4
=A3-F2:4		=A3-F1:4			@	BLACK	4
=A3-Q1:6		=A3-F1:5			@	BLACK	4
=A3-F2:6		=A3-F1:6			@	BLACK	4
=A3-F3:4		=A3-F1:N			@	BLUE	4
=A3-Q1:N		=A3-F1:N			@	BLUE	4
=A3-F2:N		=A3-F1:N			@	BLUE	4
=A3-X0:L1		=A3-Q1:1		260	@	BLACK	6
=A3-X0:L2		=A3-Q1:3		225	@	BLACK	6
=A3-X0:L3		=A3-Q1:5		200	@	BLACK	6
=A3-X19:L3		=A3-Q1:6			@	BLACK	4
=A3-X0:N		=A3-Q1:N		200	@	BLUE	6
=A3-X19:N		=A3-Q1:N			@	BLUE	4
=A3-K1:I3		=A3-F3:1			@	BLACK	1.5
=A3-T1:L		=A3-F3:1			@	BLACK	1.5
=A3-T1:N		=A3-F3:3			@	BLUE	1.5
=A3-X27:3		=A3-T1:PE			@	GREEN/YELLOW	1.5
=A3-X16:1		=A3+DVE-SA-BP1:Temp1:+			@	GRAY	0.5
=A3-X16:2		=A3+DVE-SA-BP1:Temp1:-			@	GRAY	0.5
=A3-X8:1		=A3-C1:AI2			@	GRAY	0.5
=A3-X8:4		=A3-C1:AI3			@	GRAY	0.5
systemair TIME EC Configo 3.4		TIME Ec Control system Gen-3		Project:		Rev.:	Init.:
				Drawing no.:			
				Date:		Page: 1	


Wire list

From		To	Type	Length	No.	Colour	Square
=A3-X32:3		=A3-C1:U12			@	GRAY	0.5
=A3-X11:3		=A3-C1:A03			@	GRAY	0.5
=A3-X25:3		=A3-C1:A04			@	GRAY	0.5
=A3-K4:A4		=A3-C1:D05			@	GRAY	0.5
=A3-X18:3		=A3-K4:14			@	GRAY	0.5
=A3-XDC:+		=A3-K5:14			@	WHITE	0.5
=A3-X12:3		=A3-K4:23			@	WHITE	0.5
=A3-XDC:+		=A3-K4:24			@	WHITE	0.5
=A3-X14:1		=A3-K1:14			@	BLACK	1.5
=A3-XDC:+		=A3-K1:A1			@	WHITE	0.5
=A3-K2:A4		=A3-K1:A4			@	GRAY	1.5
=A3-C1:D03		=A3-K1:A4			@	GRAY	1.5
=A3-K2:A3		=A3-K1:A3			@	WHITE	0.5
=A3-K1:A2		=A3-K2:A2			@	GRAY	0.5
=A3-XDC:+		=A3-K2:A1			@	WHITE	0.5
=A3-K3:A1		=A3-K2:A1			@	WHITE	0.5
=A3-C1:D04		=A3-K3:A2			@	GRAY	1.5
=A3-K4:A1		=A3-K3:A1			@	WHITE	0.5
=A3-K2:A4		=A3-K3:A4			@	GRAY	1.5
=A3-K2:A3		=A3-K3:A3			@	WHITE	0.5
=A3-K5:A1		=A3-K4:A1			@	WHITE	0.5
=A3-K3:A3		=A3-K4:A3			@	WHITE	0.5
=A3-C1:D06		=A3-K5:A2			@	GRAY	0.5
=A3-K4:A2		=A3-K5:A2			@	GRAY	0.5
=A3-K5:A3		=A3-K5:A1			@	WHITE	0.5
=A3-C1:D07		=A3-K5:A4			@	GRAY	0.5
=A3-K4:A3		=A3-K5:A3			@	WHITE	0.5
=A3-X4:2		=A3-C1:51 A			@	WHITE	0.5
=A3-X4:3		=A3-C1:52 N			@	WHITE	0.5
=A3-X28:4		=A3-K1:24			@	GRAY	1.5
							</

Wirelist

[illegible]

Wire list

From	To	Type	Length	No.	Colour	Square
=A3-X11:2	=A3-X0C:+			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X10:2	=A3-X0C:+			@	WHITE	0.5
=A3-K1:A3	=A3-X0C:+			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X23:2	=A3-X0C:+			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X24:2	=A3-X0C:+			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X12:2	=A3-X0C:+			@	WHITE	0.5
=A3+DVE-SA-BP1:0VDC	=A3-X0C:--			@	GRAY	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X3:--	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X21:--	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	B k	1,5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:+	=A3-X0C:+			@	WHITE	0.5
=A3-X10:1	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X11:1	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
=A3-X25:1	=A3-X0C:--			@	WHITE	0.5
=A3-X23:1	=A3-X0C:--			@	WHITE	0.5
=A3-X0C:--	=A3-X0C:--			@	WHITE	0.5
TIME EC Corrigo 3.4		Project: Control system Gen-3		Drawing no.:		Init.:
		TIME Ec		Date:		Rev.:
				19-06-2015		Page:
						4

Wire list

From	To	Type	Length	No.	Colour	Square
=A3-X24:1	=A3-XDC:-			@	WHITE	0.5
=A3-XDC:-	=A3-XDC:-			@	WHITE	0.5
=A3-XDC:-	=A3-XDC:-			@	WHITE	0.5
=A3-X12:1	=A3-XDC:-			@	WHITE	0.5
=A3-X28:3	=A3-XDC:-			@	WHITE	1.5
=A3-X17:1	=A3-K2:14			@	GRAY	0.5
=A3-X17:3	=A3-K2:24			@	GRAY	0.5
=A3+DVF-EA-FM3:5	=A3+DVF-EA-FM3:9			@	BK	1.5
=A3+DVF-EA-FM3:2	=A3+DVF-EA-FM3:4			@	-	-
=A3-X9:1	=A3+DVF-EA-FM3:4			@	-	-
=A3-X9:3	=A3+DVF-EA-FM3:10			@	-	-
=A3-X9:4	=A3+DVF-EA-FM3:1			@	GRAY	0.5
=A3-F2:1	=A3-X2:L1			@	BLACK	2.5
=A3-F2:3	=A3-X2:L2			@	BLACK	2.5
=A3-F2:5	=A3-X2:L3			@	WHITE	2.5
=A3-F2:N	=A3-X2:N			@	BLUE	2.5
=A3-T1:PE	=A3-X2:PE			@	GREEN/YELLOW	1.5
=A3-Q1:2	=A3-X19:L1			@	BLACK	4
=A3-Q1:4	=A3-X19:L2			@	BLACK	4
=A3-T1:L	=A3-X27:1			@	BLACK	1.5
=A3-T1:N	=A3-X27:2			@	BLUE	1.5
=A3+DVE-SA-BP1:Temp2:-	=A3-X15:1			@	GRAY	0.5
=A3+DVE-SA-BP1:Temp2:+	=A3-X15:2			@	GRAY	0.5
=A3-C1:30 Agnd	=A3-X5:1			@	GRAY	0.5
=A3-C1:AI1	=A3-X5:2			@	GRAY	0.5
=A3-XDC:-	=A3-X8:2			@	WHITE	0.5
=A3-XDC:+	=A3-X8:3			@	WHITE	0.5
=A3-C1:33 Agnd	=A3-X6:1			@	GRAY	0.5
=A3-C1:AI4	=A3-X6:2			@	GRAY	0.5
=A3-C1:40 Agnd	=A3-X7:1			@	GRAY	0.5
TIME EC Corrigo 3.4		Project: Control system Gen-3		Drawing no.:		Init.:
systemair		Date: 19-06-2015		Rev.:		Page: 5

Wirelist

From		To	Type	Length	No.	Colour	Square
=A3-C1:U1		=A3-X7:2			@	GRAY	0.5
=A3-C1:U4		=A3-X32:1			@	GRAY	0.5
=A3-XDC:-		=A3-X32:2			@	WHITE	0.5
=A3-X3:N		=A3-X21:N			@	BLACK	0.5
=A3-X3:L		=A3-X21:L			@	BLACK	0.5
=A3-C1:A02		=A3-X10:3			@	GRAY	0.5
=A3-K4:13		=A3-X18:4			@	GRAY	0.5
=A3-F3:3		=A3-X14:2			@	BLUE	1.5
=A3-X0:PE		=A3-X14:3			@	GREEN/YELLOW	1.5
=A3-K5:13		=A3-X23:3			@	WHITE	0.5
=A3-X24:3		=A3-X23:3			@	WHITE	0.5
=A3-C1:61 A		=A3-X3:N			@	BLACK	0.5
=A3-C1:60 B		=A3-X3:L			@	BLACK	0.5
=A3-C1:50 B		=A3-X4:1			@	WHITE	0.5
=A3-C1:D11		=A3-X25:4			@	GRAY	0.5
=A3-XDC:+		=A3-X28:1			@	WHITE	0.5
=A3-X40:4		=A3-X28:4			@	GRAY	1,5
=A3-K1:23		=A3-X28:5			@	GRAY	1,5
=A3-K3:23		=A3-X29:2			@	WHITE	0.5
=A3-C1:A03		=A3-X29:3			@	GRAY	0.5
=A3-K5:23		=A3-X29:5			@	GRAY	1,5
=A3-X28:1		=A3-X40:1			@	WHITE	0.5
=A3-X28:2		=A3-X40:2			@	GRAY	0.5
=A3-X28:3		=A3-X40:3			@	WHITE	1,5
=A3-X28:5		=A3-X40:5			@	GRAY	1,5
=A3-X29:1		=A3-X41:1			@	WHITE	0.5
=A3-X29:2		=A3-X41:2			@	WHITE	0.5
=A3-X29:3		=A3-X41:3			@	GRAY	0.5
=A3-X29:4		=A3-X41:4			@	GRAY	1,5
=A3-X29:5		=A3-X41:5			@	GRAY	1,5
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Wirelist

[illegible]

[illegible]

Cabelplan

—W100

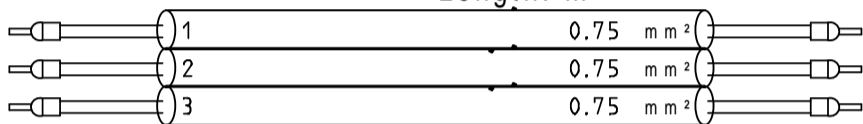
Type:
Dimension:
Length: m



- X14:1
- X14:2
- X14:3

$$-W^{122}$$

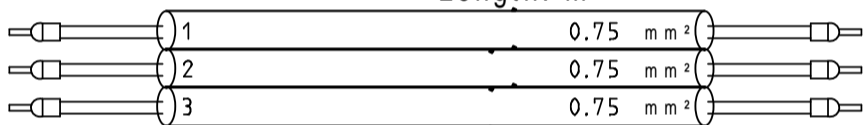
Type:
Dimension: 3x0,75mm2
Length: m



- X10:1
- X10:2
- X10:3

$$-W^{123}$$

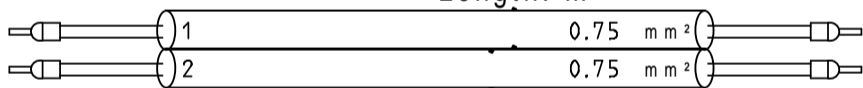
Type:
Dimension: 3x0,75mm2
Length: m



- X11:1
- X11:2
- X11:3

—W305

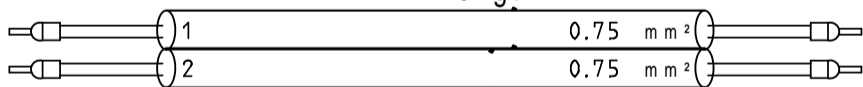
Type:
Dimension: 2x0,75mm2
Length: m



- X5:1
- X5:2

—W307

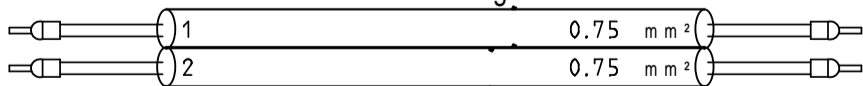
Type:
Dimension: 2x0,75mm2
Length: m



- X7:1
- X7:2

—W308

Type:
Dimension: 2x0,75mm2
Length: m



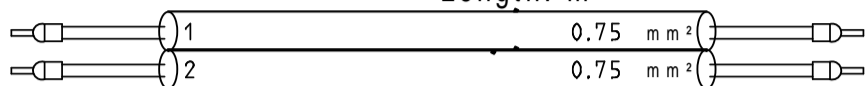
- X32:1
- X32:2

Sheet	Path
1	1.B
1	1.B
1	1.B
1	3.B
1	3.B
1	4.B
1	6.B
1	6.B
1	6.B
1	1.F
1	1.F
1	5.F
1	5.F
1	7.F
1	7.F

Cabelplan

—W309

Type:
Dimension: 2x0,75mm2
Length: m

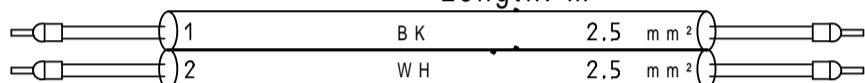


-X32:2

-X32:3

—W310

Type:
Dimension: 2x0,25mm2
Length: m

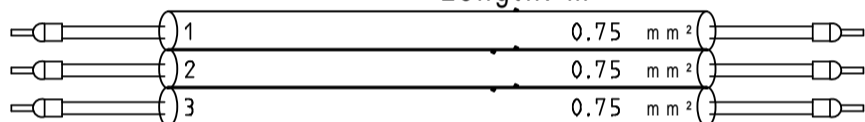


-X6:1

-X6:2

—W401

Type:
Dimension: 3x0,75mm²
Length: m



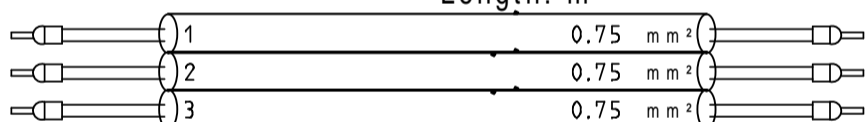
-X8:3

-X8:1

-X8.2

—W402

Type:
Dimension: 3x0,75mm2
Length: m



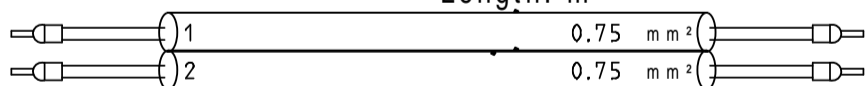
-X8:3

-X8.4

- Y 8.2

—W510

Type:
Dimension: 2x0,75mm2
Length: m

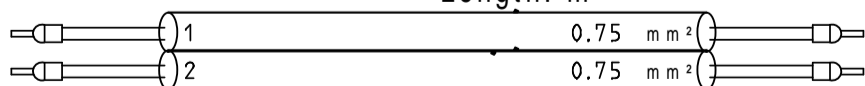


-X34:1

-X34.2

—W511

Type:
Dimension: 2x0,75mm2
Length: m



-X34:3

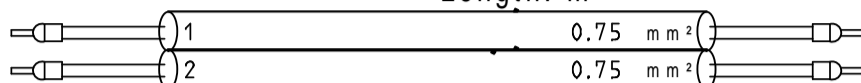
-X34.4

[illegible]

Cabelplan

—W1010

Type:
Dimension: 2x0,75mm2
Length: m

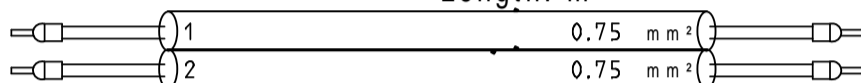


-X17:1

-X17;2

—W1020

Type:
Dimension: 2x0,75mm2
Length: m

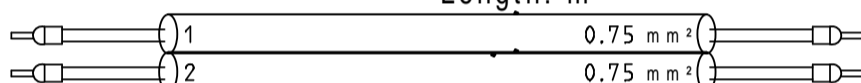


-X17:3

-X17:4

—W1030

Type:
Dimension: 2x0,75mm2
Length: m

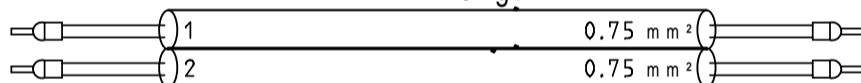


-X18:1

-X18:2

—W1040

Type:
Dimension: 2x0,75
Length: m

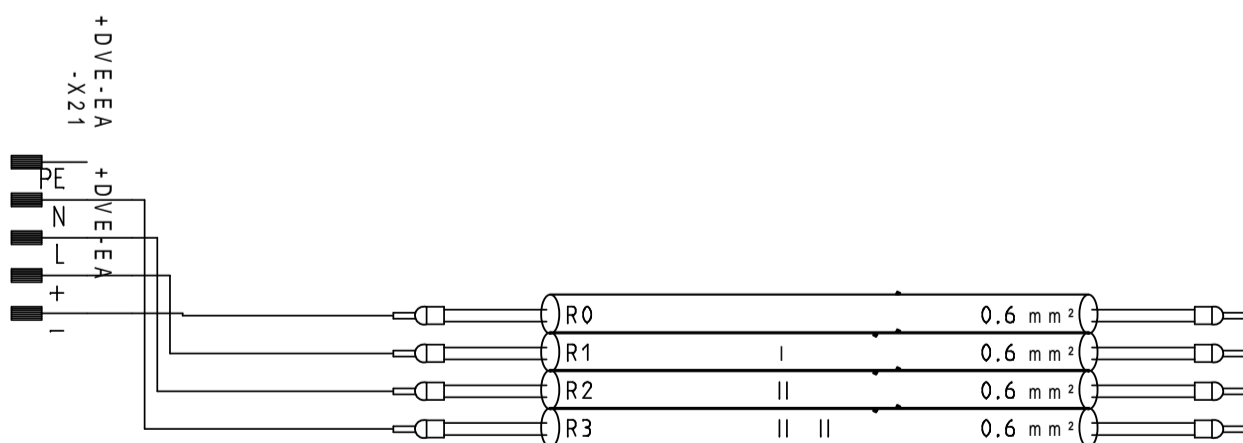


-X18:3

-X18:4

=A3-W625

Type:
Dimension: 2x2x0,6mm2
Length: m



-X21:-

-X21;+

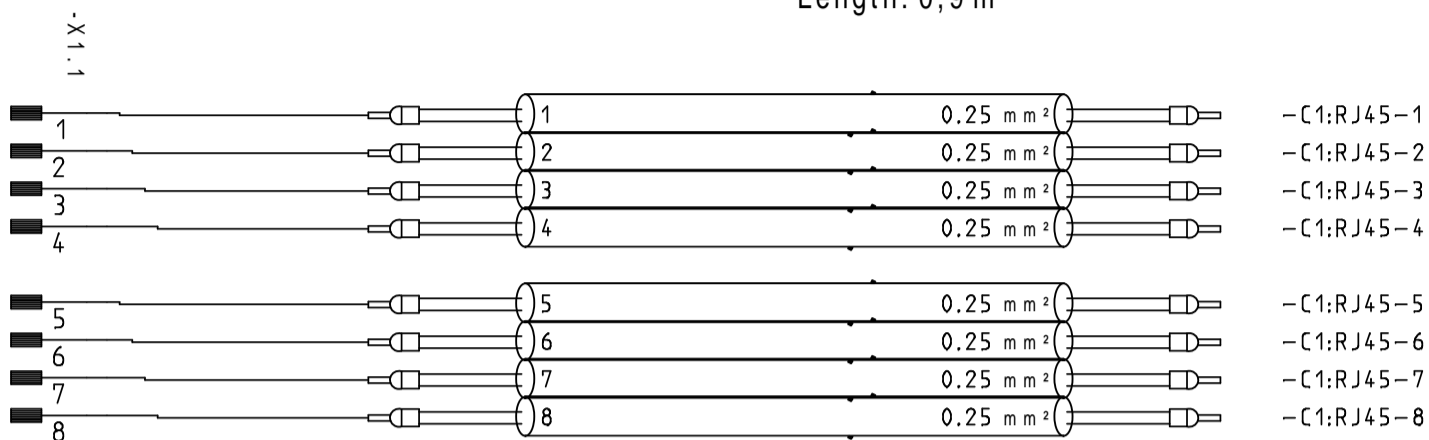
-X21:L

$$-Y_{21} \cdot N$$
[illegible]

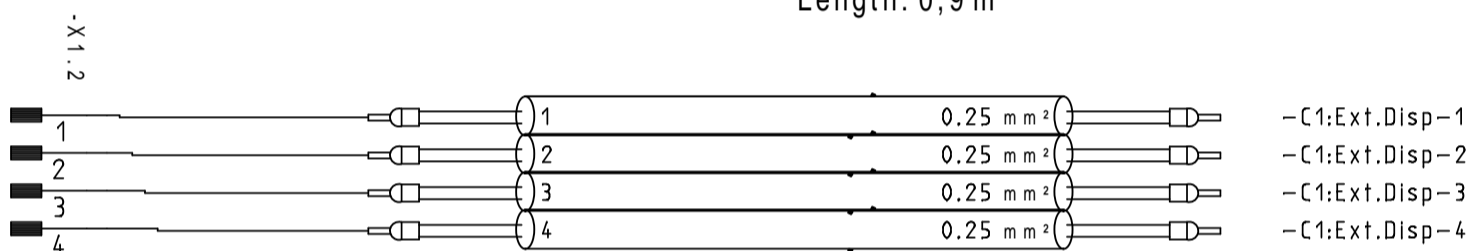
Cabelplan

$$=A3+CON-W90.1$$

Type: LC14-0574-AA000
Dimension: RJ45-8P/8C
Length: 0,9 m

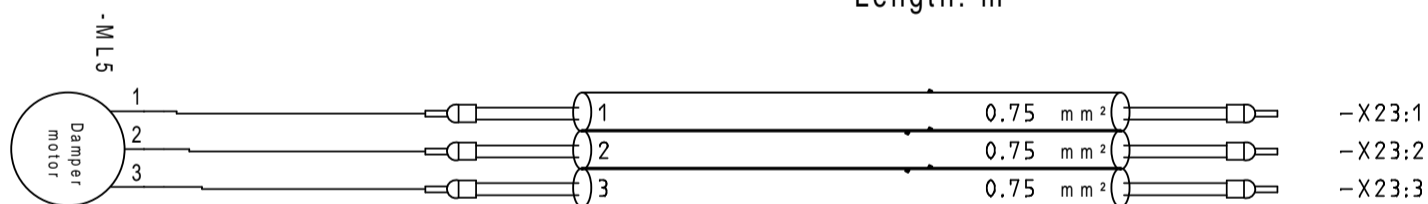

$$=A3+CON-W90.2$$

Type: LC15-0003-AA000
Dimension: RJ11-6P/4C
Length: 0,9 m



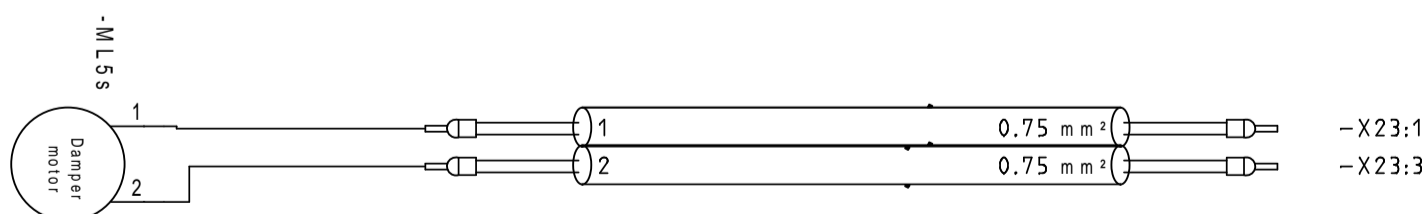
=A3+DVA-EA-W105

Type:
Dimension: 3x0,75mm2
Length: m



=A3+DVA-EA-W105s

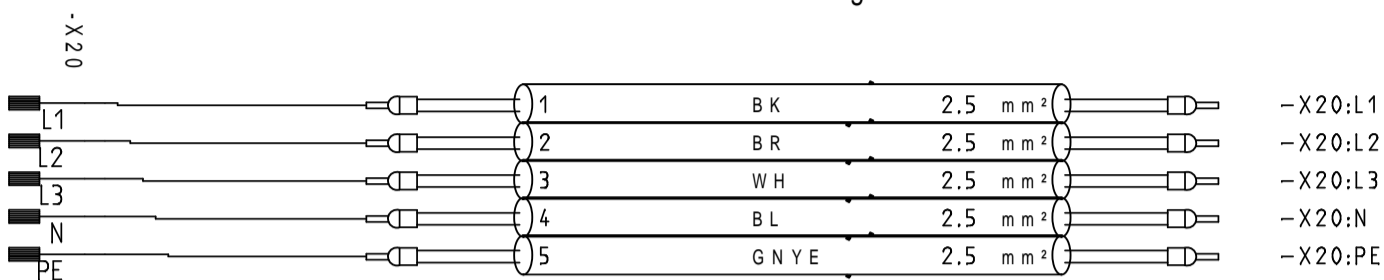
Type:
Dimension: 2x0,75mm2
Length: m

[illegible]

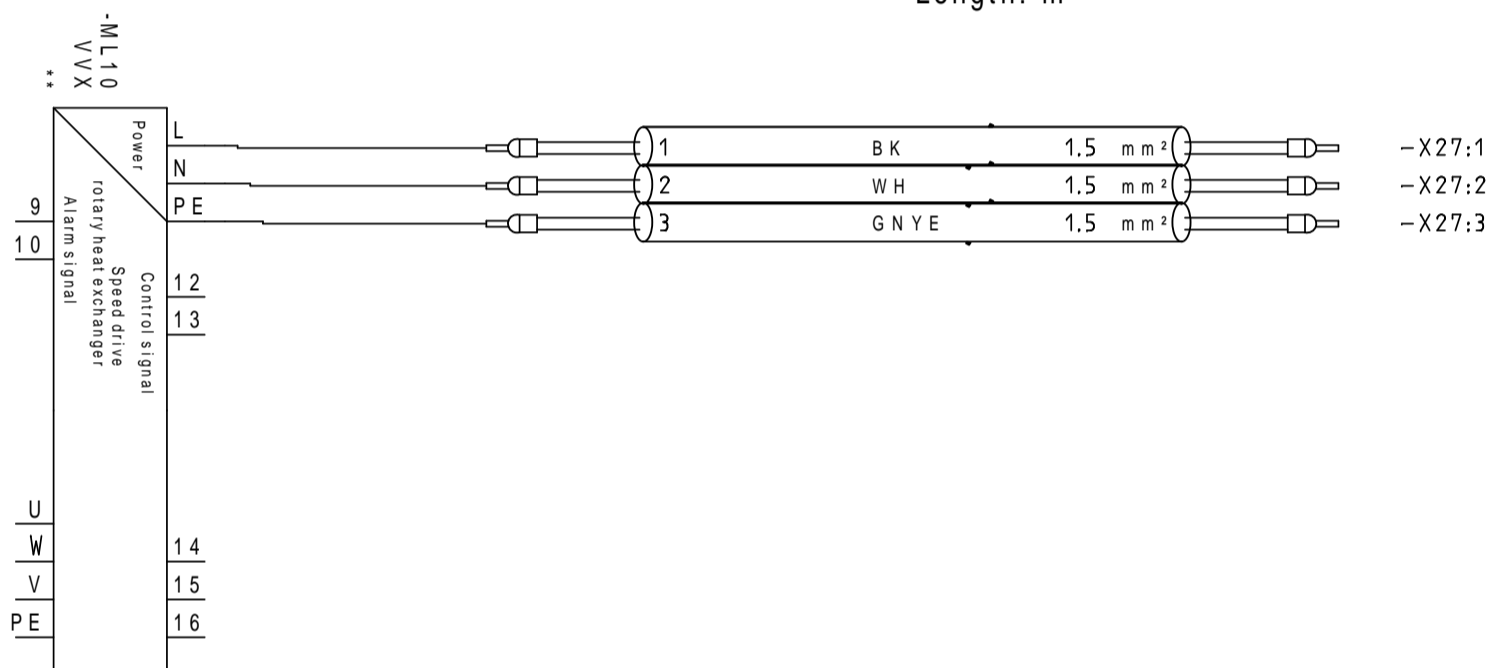
Cabelplan

$$=A3+DVC-W102$$

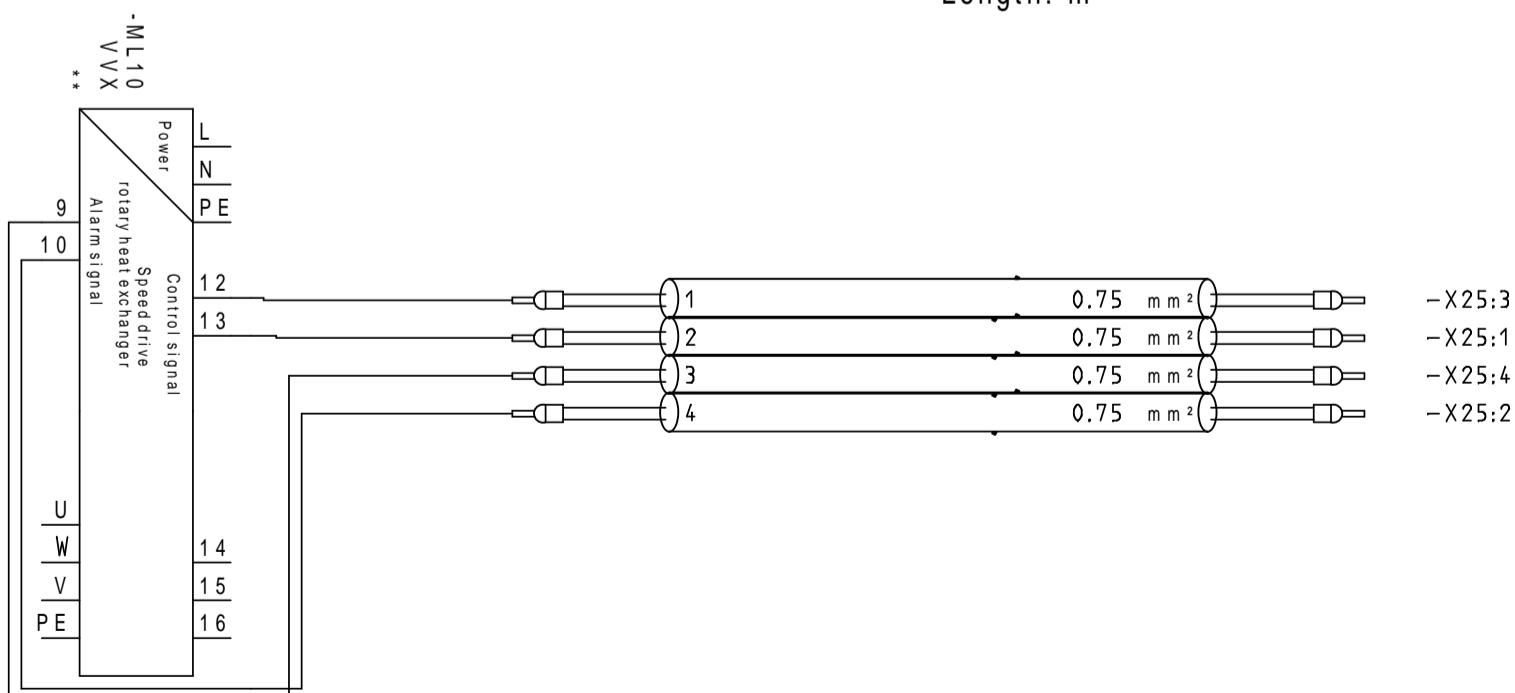
Type:
Dimension: 5G2.5mm2
Length: m


$$=A3+DVC-W110$$

Type:
Dimension: 3G1,5mm2
Length: m


$$=A3+DVC-W110.1$$

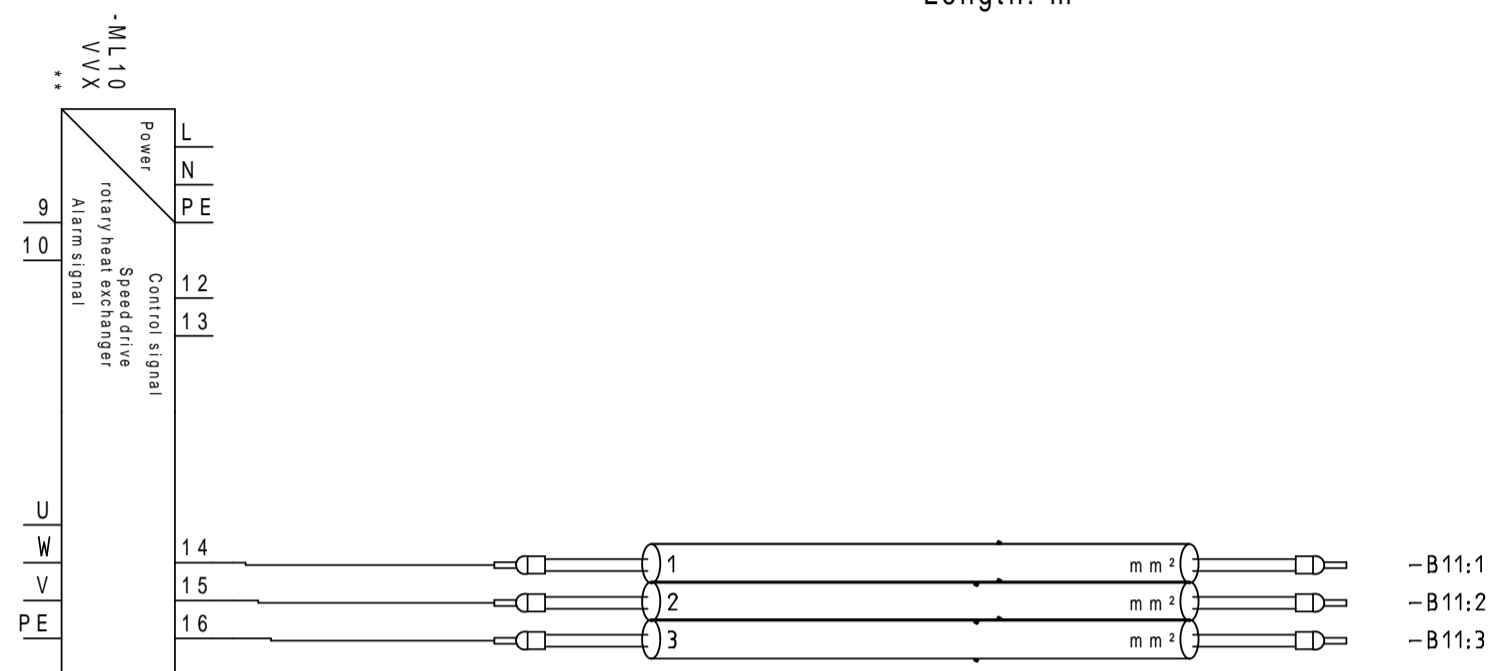
Type:
Dimension: 4x0,75mm2
Length: m

[illegible]

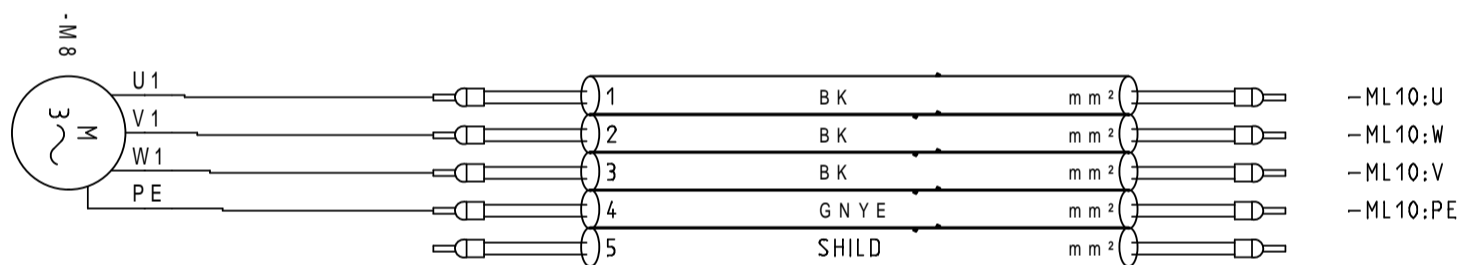
Cabelplan

$$=A3+DVC-W110.2$$

Type:
Dimension: 3x0,25mm2
Length: m

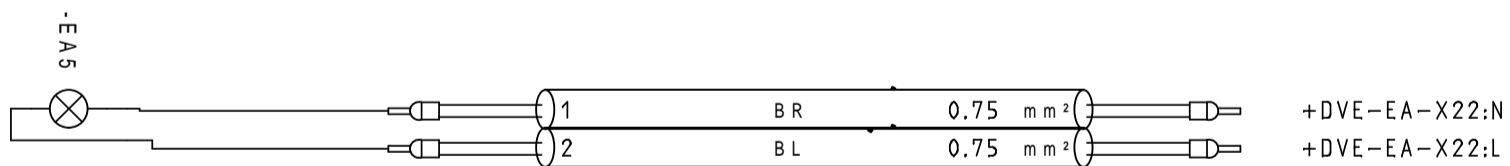

$$=A3+DVC-W110.3$$

Type:
Dimension: 3G1.5/SHILD
Length: m



=A3+DVC-W705

Type:
Dimension: 2x0.75mm²
Length: m

[illegible]

=A3+DVE-EA-W102

18.18 kV
-ML2
U1
V1
W1
M
3
PE
Extract air

Line	Label	Cross-section
1	B R	2.5 mm²
2	B K	2.5 mm²
3	W H	2.5 mm²
4	G N Y E	2.5 mm²

-X20:L1
-X20:L2
-X20:L3
-X20:PE

=A3+DVE-EA-W304

[illegible]

=A3+DVE-EA-W630

[illegible]

=A3+DVE-EA-W640

Wiring diagram for the 4-wire CAN bus connection:

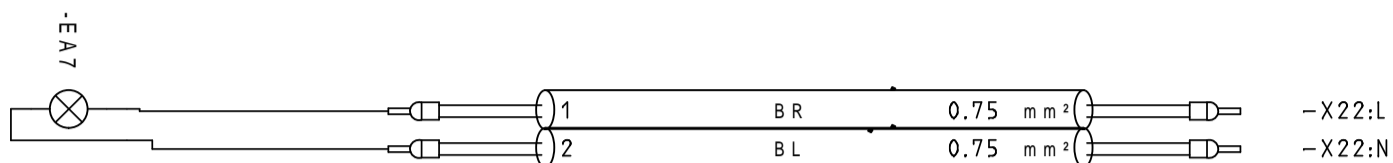
- Connector pins (left to right): B (D-), A (D+), GND, -ML2.
- Wiring connections:
 - B (D-) is connected to R0.
 - A (D+) is connected to R1.
 - GND is connected to the ground of the CAN bus.
 - ML2 is connected to R2.
 - R3 is connected to the ground of the CAN bus.
- Each wire (R0, R1, R2, R3) has a cross-sectional area of 0.6 mm^2 .
- The right side of the cable shows four individual wires connected to terminals labeled -X21:-, -X21:L, and -X21:N.

Path	Sheet
8.K	15
8.K	15
8.K	15
9.K	15
16.J	18
17.J	18
15.F	18
15.F	18
15.F	18
14.F	18
18.F	18
18.F	18
17.F	18
17.F	18

Cabelplan

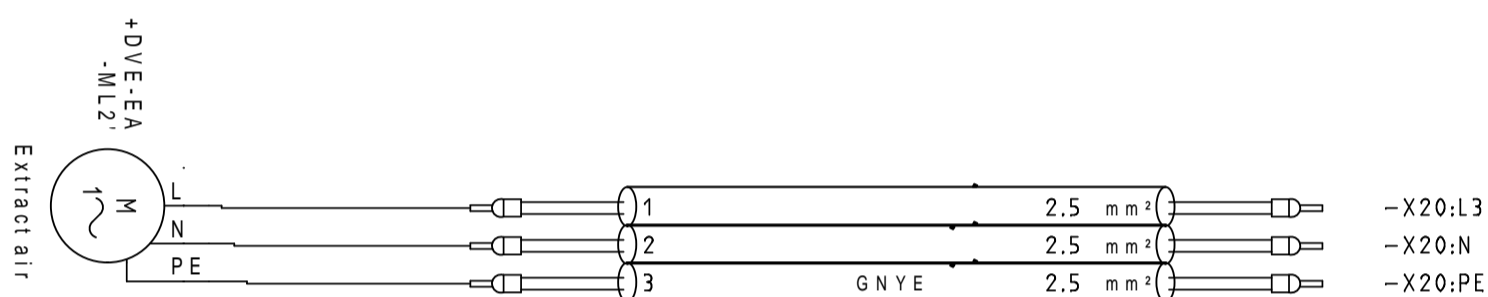
=A3+DVE-EA-W707

Type:
Dimension: 2x0.75mm²
Length: m



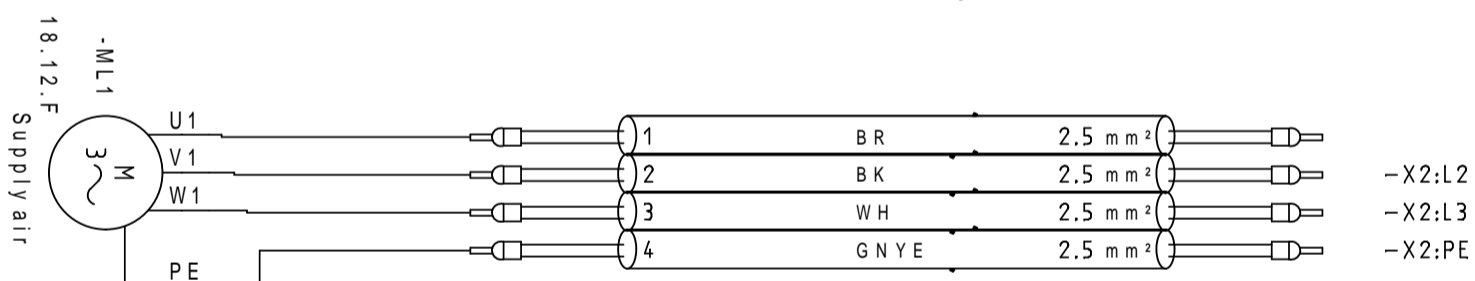
=A3+DVE-EA+230V-W102

Type:
Dimension: 3G2,5mm2
Length: m



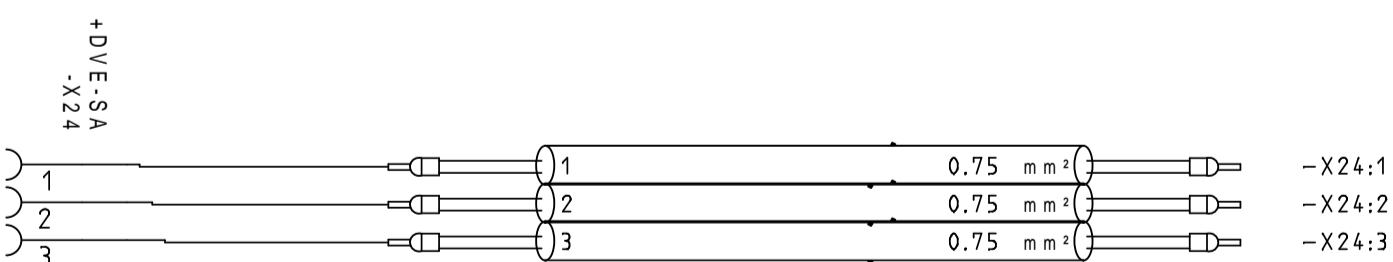
=A3+DVE-SA-W101

Type:
Dimension: 4G2,5mm2
Length: m



=A3+DVE-SA-W106

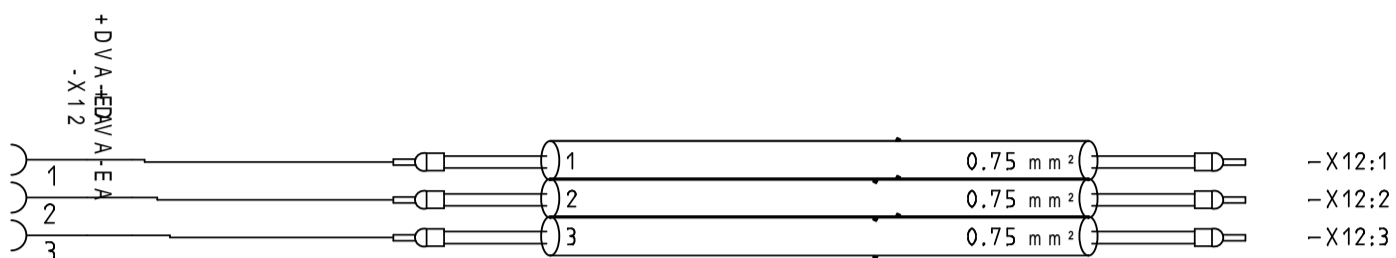
Type:
Dimension: 3x0,75mm2
Length: m

[illegible]

Cabelplan

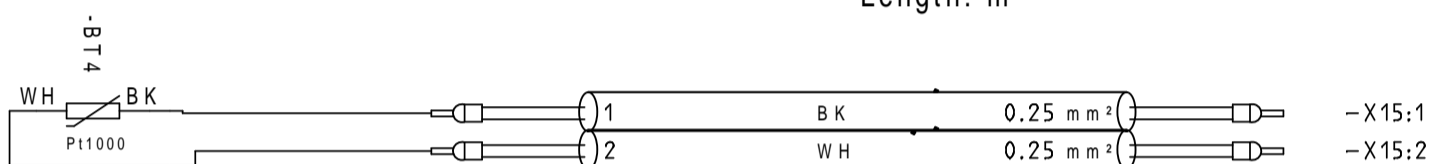
=A3+DVE-SA-W107

Type:
Dimension: 3x0,75mm2
Length: m



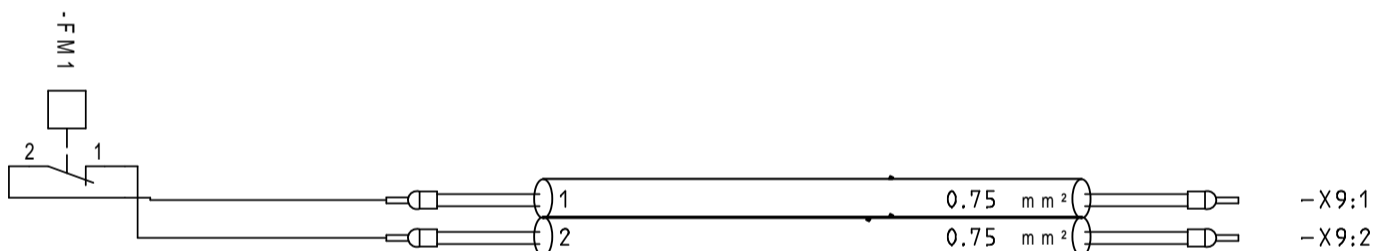
=A3+DVE-SA-W302

Type:
Dimension: 2x0,25mm2
Length: m



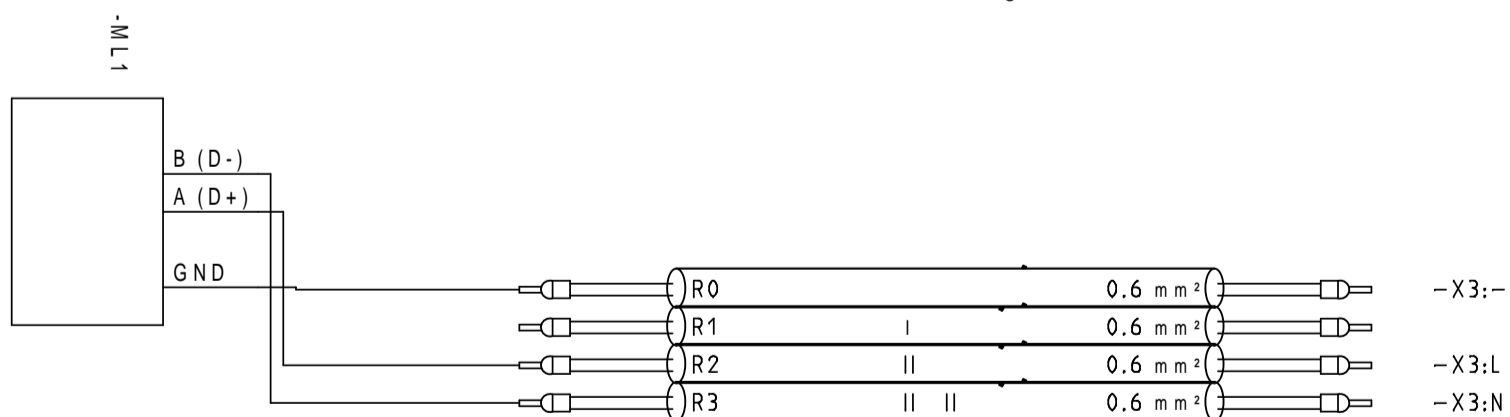
=A3+DVE-SA-W451

Type:
Dimension: 2x0,75
Length: m



=A3+DVE-SA-W620

Type:
Dimension: 2x2x0.6mm²
Length: m

[illegible]

Cabelplan

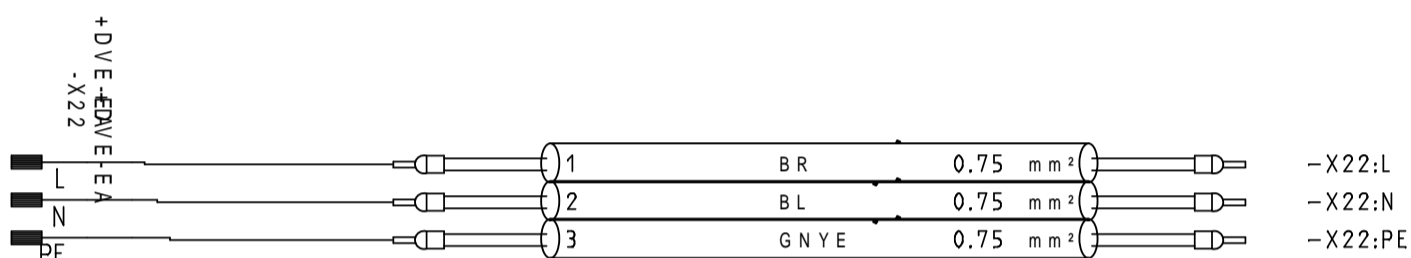
=A3+DVE-SA-W701

Type:
Dimension: 2x0.75mm²
Length: m



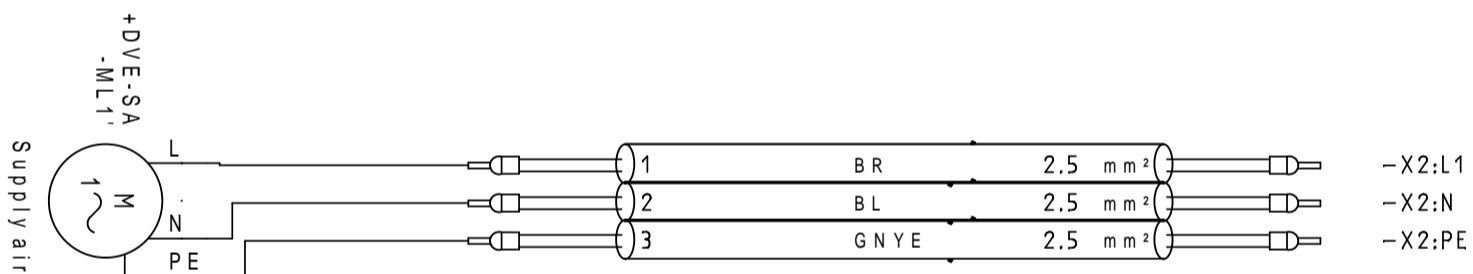
=A3+DVE-SA-W703

Type:
Dimension: 3G0.75mm²
Length: m



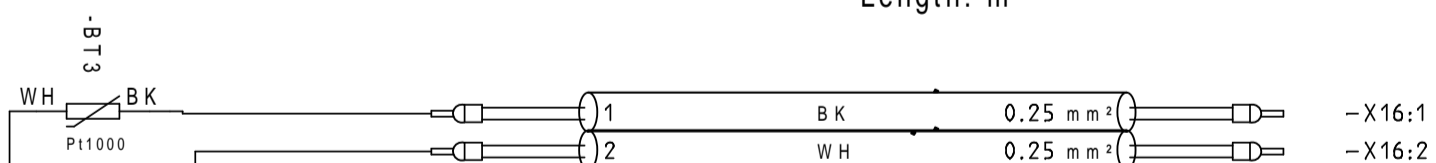
=A3+DVE-SA+230V-W101

Type:
Dimension: 3G2,5mm2
Length: m



=A3+DVF-EA-W303

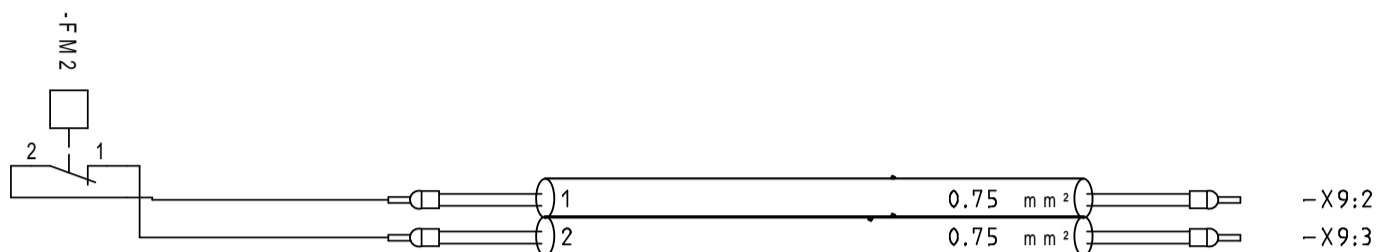
Type:
Dimension: 2x0,25mm2
Length: m

[illegible]

Cabelplan

=A3+DVF-EA-W452

Type:
Dimension: 2x0,75mm2
Length: m



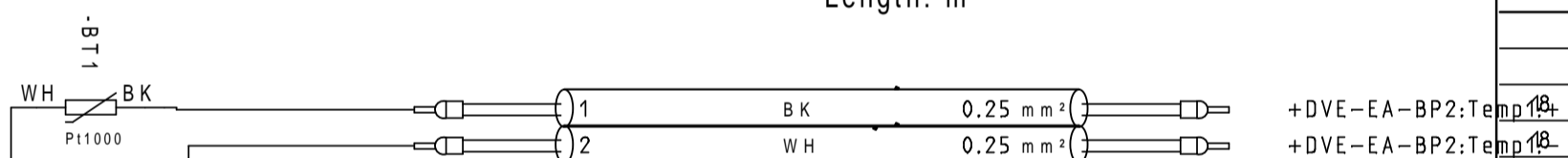
=A3+DVF-EA-W702

Type:
Dimension: 2x0.75mm2
Length: m



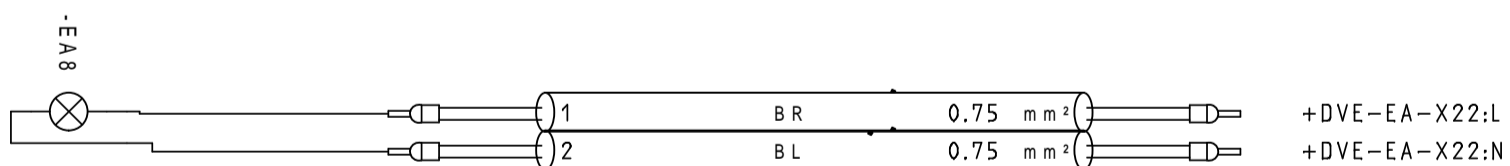
=A3+DVF-SA-W301

Type:
Dimension: 2x0,25mm2
Length: m



=A3+DVF-SA-W708

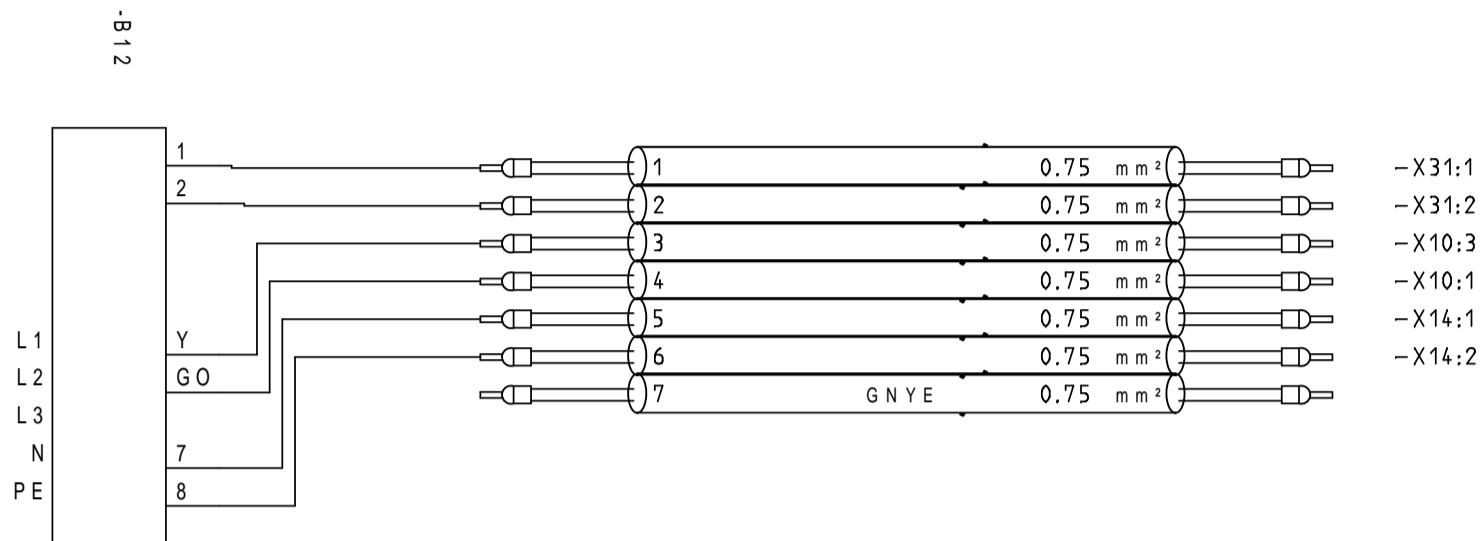
Type:
Dimension: 2x0.75mm²
Length: m

[illegible]

Cabelplan

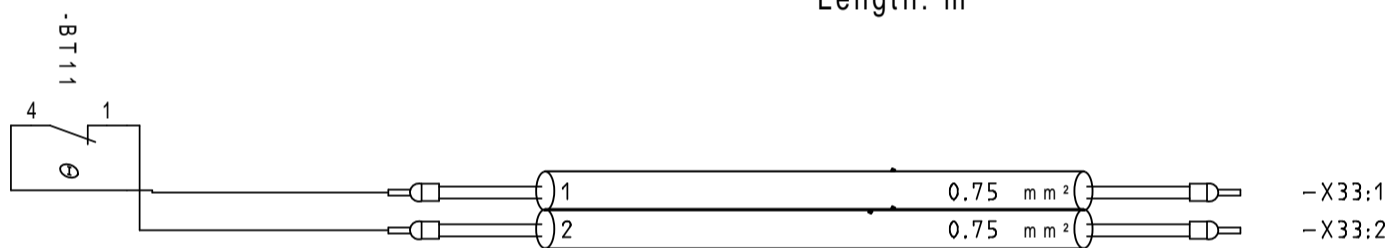
=A3+DVH-SA-W151

Type:
Dimension: 7G0,75mm2
Length: m

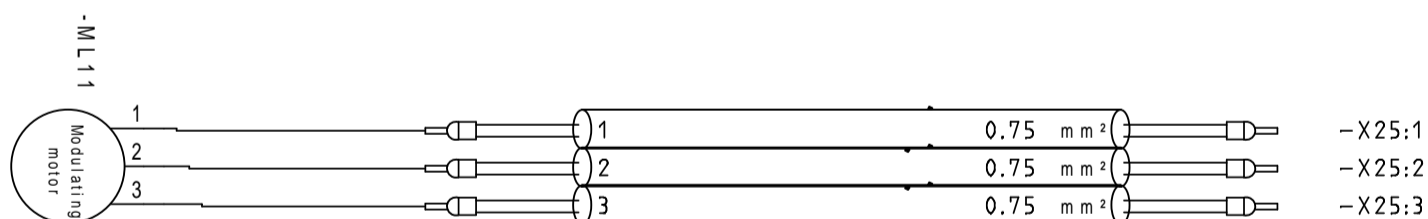


=A3+DVH-SA-W311

Type:
Dimension: 2x0,75mm2
Length: m

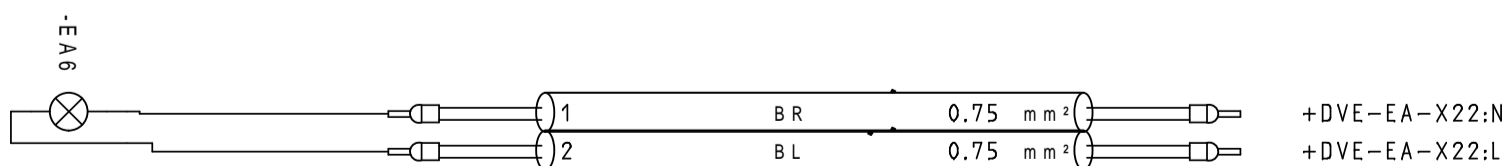

$$=A3+DVQ-EA-W111$$

Type:
Dimension: 3x0,75mm2
Length: m



=A3+DVQ-EA-W706

Type:
Dimension: 2x0.75mm²
Length: m

[illegible]

=A3+EXT-DV-W700

0.25

1 BR 0.75 mm² -X13:L

2 BL 0.75 mm² -X13:N

=A3+EXT-DVH-W122

Diagram illustrating the ML22 Modulating Motor assembly. The motor is connected to three output lines (1, 2, 3) which pass through a series of components, including a 0.75 mm² section, and terminate at three separate connectors labeled -X10:1, -X10:2, and -X10:3.

=A3+EXT-DVH-W310

The diagram illustrates a temperature measurement setup. A Pt1000 sensor is connected to a Wheatstone bridge (WH) and a bridge circuit (BK). The bridge circuit is connected to a cable with two conductors, labeled 1 and 2, with a cross-section of 2.5 mm². The conductors are connected to a terminal block with labels -X6:1 and -X6:2.

=A3+EXT-DVK-W123

-M L 23

Modulating motor

1 2 3

1 2 3

0.75 mm² 0.75 mm² 0.75 mm²

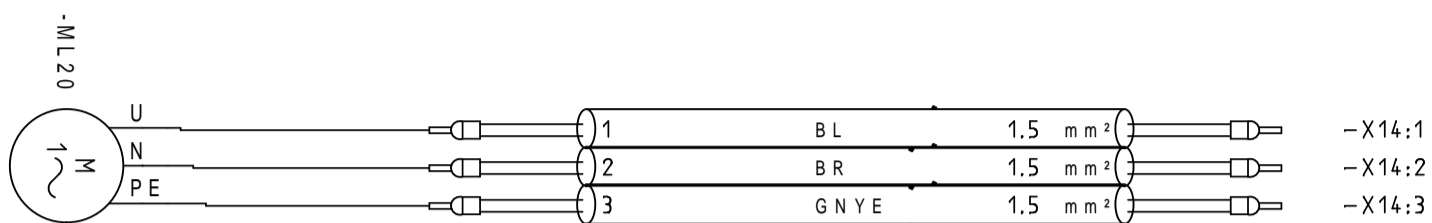
-X11:1 -X11:2 -X11:3

[illegible]

Cabelplan

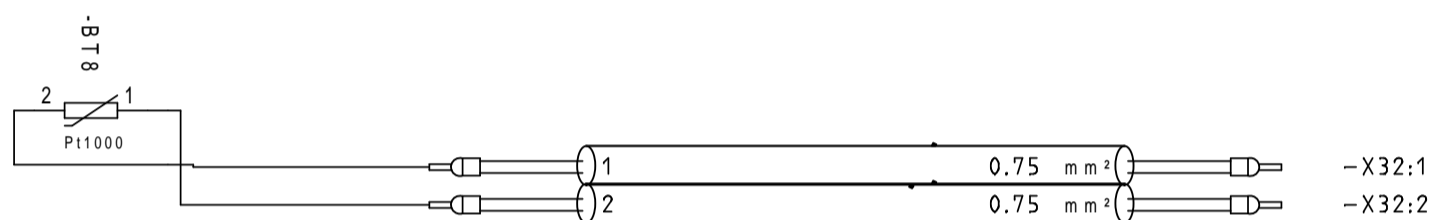
=A3+EXT-X-W100

Type:
Dimension: 3G1.5mm2
Length: m



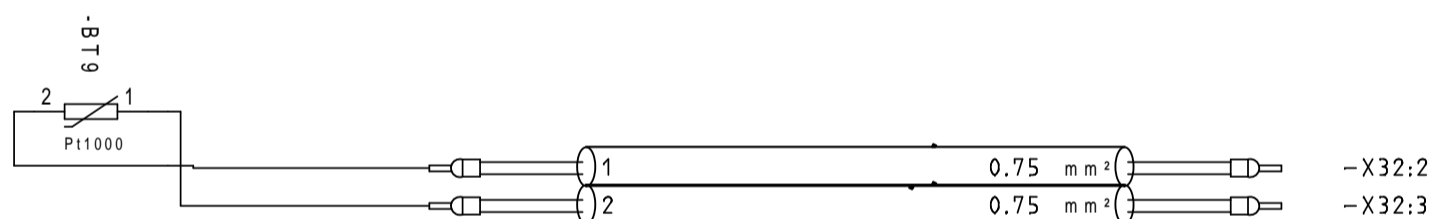
=A3+EXT-X-W308

Type:
Dimension: 2x0,75mm2
Length: m



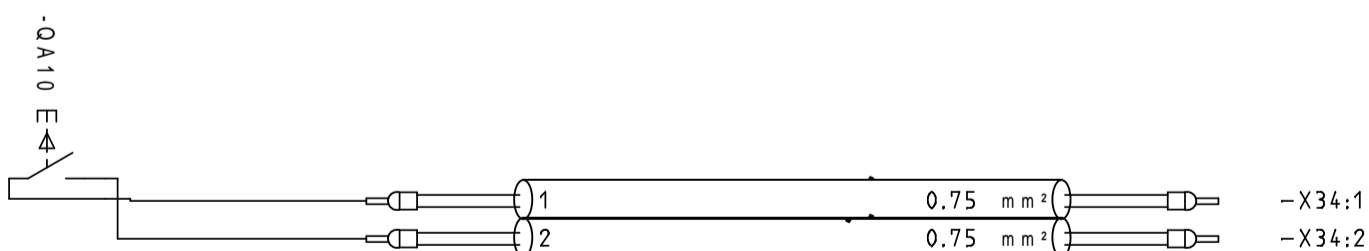
=A3+EXT-X-W309

Type:
Dimension: 2x0,75mm2
Length: m



=A3+EXT-X-W510

Type:
Dimension: 2x0,75mm2
Length: m

[illegible]



=A3

=A3+EXT-X-W1030

=A3+EXT-X-W1040

-Operation signal ———— 1 0.75 mm² ———— -X18:3

-Operation signal ———— 2 0.75 mm² ———— -X18:4

[illegible]

Part number 90925370



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